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HONORABLE J. G. DRAKE, M.L.C.,

Born in London, 1850. Landed in Queensland 1874, where he settled down to press work and was for 10 years a reporter of the Queensland *Herald*. Whilst acting as a member of the *Herald* staff he studied law and was admitted to the Queensland Bar in June, 1882. At the general election in 1888, Mr. Drake was elected as the member for Enoggera, which constituency he represented until he was appointed to the Legislative Council in 1899, and to the position of Postmaster General and Secretary for Public Instruction. Mr. Drake holds a commission as Major in the Queensland (Land) Defence Force.

Ourselves.

THE *Queensland Agricultural Journal*, with this number, enters on the last half of its fourth year of issue, and we have every reason to believe that its utilitarian character has been maintained throughout, and that agriculturists and others engaged in rural pursuits have derived much benefit and assistance from the various articles written by experts in the different branches of industry to which the pages of the *Journal* are devoted. It has occasionally been suggested to us that we should deal also with the great questions of the day, such as the war in South Africa, the railway policy of the Government, federation, &c. We have most carefully avoided any but the barest reference to these subjects, and then only when such reference was necessary in the interests of the farming, planting, and pastoral industries. As we stated in our first introductory article, the objects the Department of Agriculture chiefly desires to promote are—The education of both young and old in the technical knowledge of agriculture; the formation of associations or bodies of farmers, both for the attainment of objects of material importance to their welfare and the providing of adequate means of giving expression to the general sense of that important section of the community.

The Department recognises that its first duty is to take the initiative in agricultural education, and this duty has been systematically performed. Ample provision has been made for the education of the young in that direction by the establishment of an Agricultural College in the South, the first institution of its kind in the colony, but only, it is hoped, the precursor of future colleges in other portions of the colony, as soon as population and the general prosperity of the people warrant their establishment. But the agricultural education of the young is not the only object aimed at by the Department in the matter of education. There are many settled on the land who have never gone through a course of agricultural training, who have started on their own account as amateur farmers—amateurs in this sense only that they have settled on the land owing to a preconceived inclination to a farming life, but earnest workers as men whose living depends upon the produce of the soil. Provision, therefore, had to be made for imparting instruction to them. Farmers, it has been said, are very conservative—they stick to old fashions and theories; but this scarcely applies to the Australian farmer, however just a reproach it may be to those who have spent a long life in one single farming district of the old country, never perhaps going further from their ancestral acres than the nearest market town. Australian farmers are progressive and receptive, and in no way has this been more conclusively shown than in the foundation of the 121 agricultural, horticultural, and pastoral societies which have been formed in every farming, planting, and pastoral centre throughout the colony—all with a fair number of members, many with a very numerous membership. These people recognise the fact that there is no man living, be he young or old, who has not something to learn, and that this holds especially in the case of farmers. Science, in the shape of chemistry, has come to their aid, and has opened up hitherto undreamed-of possibilities in raising the yield of produce, in reducing the cost of production, and in developing new methods of treating

the increased crops. Time was, not so long since, that the sugar planters thought they had the most up-to-date methods of cane-planting and of sugar manufacture; but, whilst they have been working in this belief, Science has been working in their interests, and the necessity for a new education forces itself upon them. It is the same with all classes of the rural world—wheat-growers, fruitgrowers, tobacco-growers, vigneron, &c. In all their several occupations, owing to the triumphs of scientific research, a wide field is opened for the work of specialists in each branch. Nor has the Department had reason to be disappointed at the results of the appointment of their specialists. The farmers, at first doubtful, rapidly became converts to the new methods indicated, with the result that the demand for their services almost exceeds the ability of the Department to concede. Then there is another class of men who specially benefit by the instruction thus afforded. These are newly arrived farmers from Great Britain and other countries and colonies. Many of them have been expert farmers in their former homes, but, totally unacquainted with our various climates, soils, rainfall, and other conditions, with no local experience, they are liable to fall into many mistakes which, under the guidance of competent men, they are able to avoid.

Thus the Department extends its aid to young and old in whatever district of this large State they may be found in settled communities.

To compass this end the more effectually, State farms have been established in suitable localities, in each of which the climatic conditions are totally distinct. Thus there are State establishments in tropical Cairns, in semi-tropical Mackay and near Rockhampton, in the temperate Wide Bay district, and on the cool tablelands of the Downs, both near Toowoomba and Warwick. There is an experimental orchard on the shores of Moreton Bay, and a State tobacco farm in Texas, a district always noted as being the ideal tobacco country of the State. The object of establishing these farms and colleges was the instruction of all agriculturists, young and old, in the particular culture adapted to different climates, and that object has been attained in a most gratifying manner, as is evidenced by the numerous visits paid by farmers, both singly and in companies, to each of the State establishments, where they obtain new ideas, study new methods of cultivation, preparation and storage of crops, and carry away with them a fund of information which not only benefits themselves, but their immediate neighbours. Such are some of the objects of the Department of Agriculture, and for such purposes of instruction was the *Agricultural Journal* established.

It was never intended that the *Journal* should infringe in any way the rights or privileges of any of the public daily or weekly journals. Their function is to furnish the news of the day, and, in the case of rural publications, to do their share in affording information and instruction to their subscribers. The function of this *Journal* is purely and simply to advise and instruct farmers through the pens of the specialists who fill its pages with information, advice, and instruction. This has been the course hitherto pursued, and which will be steadily kept in view in the future.

Agriculture.

FIELD AND GARDEN REMINDER FOR JANUARY.

By HENRY A. TARDENT

Manager, Biggenden Experiment Farm.

In the dry interior, January is usually the hottest month in the year, and the most trying to both animal and plant life. The grape vine, the cow pea, some of the sorghums, such as the White and the Red Kafir corns, can alone stand such hot, dry weather, and that only when planted in a deeply ploughed and well-tilled soil.

Those who, in accordance with last month's directions, have ploughed their stubble lands and sown them with cow peas will now see the crop growing slowly but steadily until the rainy season sets in, when they will make a rapid growth and give an abundance of feed for the farm animals, and a very fair monetary return for the beans. When the plants are from 3 to 6 inches high the field should be gone over with light harrows. Provided the harrows are kept clean from accumulating rubbish, no plant will be injured or destroyed, and the harrowing will do a wonderful good to the crop. Later on, use the Planet Junr. or any suitable scarifier, after which the crop will take care of itself and cover the whole field.

On the coast, January is often a wet month, especially towards the end. Not much, of course, can be done in the field except to keep the weeds down and the surface soil loose and friable whenever the weather and the state of the land will permit. In some cases, new land, especially if heavy, can also be broken up. If the work has not yet been done, plough all stubble land. The longer this is done before sowing, the better. No hard-and-fast rule can be given for the depth to plough, as soils and circumstances vary so much. Usually, excellent results are obtained from a deep ploughing given now, followed in two or three months by a shallow ploughing given just before sowing. This gives a well-pulverised seed-bed, and the firm bottom so suitable to wheat and other cereals. Everywhere steps should be taken to prevent damages from the now approaching heavy rains and possible floods. On hilly fields, drills should be drawn across the declivity, and never downhill. See that proper surface drains carry off the surplus water. A simple plough furrow, drawn in time and in the proper place, will often save tons and tons of the best soils from being washed away and lost for ever.

Where there is danger of erosion along river banks and creeks, it is a good plan to plant some quick-growing trees with an abundant system of roots, such as the weeping willow, for instance. I am not aware that the osier, the tree so largely grown in the old country for wicker-work, has been grown here. It may, perhaps, be well worth a trial, and its place would be along the banks of creeks and rivers, where it should thrive best, and act also efficiently as a preventive of erosion. Both species grow well from cuttings or truncheons—simple sticks 2 or 3 feet long, planted direct into the soil, will grow and develop into trees if the weather is anything like favourable. The weeping willow is a very ornamental tree, and does well to line the landscape at the end of the cultivation.

On scrub farms every opportunity should now be utilised to get out the dead and half-rotten stumps which prevent the use of the plough and other cultivating implements. This can be done with horses, bullocks, and also by means of levers and other machines invented for the purpose by human ingenuity. When the soil has been softened by abundant rains these old stumps come out easily and with comparatively little expense.

Rainy days should not be wasted. There is always plenty to do about the barn and house. A shilling's worth of oil and 6d. worth of elbow grease used on the harness and saddlery will save many pounds which otherwise will have to go to the saddler. See also that all implements are in good order, tighten the bolts in the wooden parts, put new handles and new pieces into implements where required. Sharpen well the edged tools and saws, and have them put up in a handy place where they can be found when required.

When the weather is favourable, sowing can yet be made in warm places of quick-growing varieties of maize, pumpkins, squashes, marrows, water and rock melons, cucumbers, beets, and beet roots, cow pea for fodder and manurial purposes.

In beds protected from the heat of the midday sun, sowings can now be made of early cabbages. Succession, Cannon Ball, Schweinfurt, and especially Improved St. John, are good sorts to grow at this season. Of cauliflowers, the Large Asiatic is the surest cropper.

Never forget to spread on the bed a thin layer of fresh horse manure. Not only will it help the growth of the plants, but it also emits a strong ammoniacal smell, which keeps off the flies and other insect pests.

Tomatoes can yet be sown, but the best plan, at this time of the year, is to multiply from cuttings taken from the best sorts you have in your garden. Make the cuttings about 1 foot long, if possible; strip off all side branches and leaves, leaving only those of the upper end; plant in a slightly slanting fashion, leaving only 1 or 2 inches out of ground. Water copiously, and, if dry, protect from the heat of the sun for a few days with some paper, bark, or pieces of board. They will soon develop roots and start growing. They will give a quicker return and larger fruits than those grown from seed, but perhaps not so many fruits.

Above all, keep the land clean and well pulverised, and in spite of the dry weather there will be yet some sort of crop.

LINSEED AND FLAX.

When it has been satisfactorily shown that any product can be grown to perfection in this colony, the next step is to see whether it can be grown to a profit. Sugar-cane, cotton, coffee, rice, and several other introduced plants have long since passed the experimental stage, and can all be grown profitably, depending, of course, on the inevitable vicissitudes of the home and foreign markets.

It has been conclusively shown that flax will thrive in Queensland, and produce seed and fibre equal to any European product. Mr. F. M. Bailey, Government Botanist, states that the Darling Downs are eminently adapted to the growth of flax, both for seed and fibre. In New Zealand, flax finds an ideal home. This does not refer to the native New Zealand flax, but to the introduced plant from which the linseed is derived.

In Ireland, the finest flax is produced, from which the most delicate linen is woven. But in Ireland there are linen factories. Here we have not yet even the flax itself, but we can produce the seed and good fibre, which latter can be used for a variety of purposes. Flax has been grown as an experiment at Oxley, Pimpama, and at other places on the coast, and has attained a height of 4 feet, which is quite sufficient for the home trade. One great advantage which the colonial flax-grower has over the British is that he can produce a crop of linseed as well as a crop of fibre. In Europe only one crop is produced—either seed or fibre.

On this subject we take the gist of an article on "Linseed and Flax" from the *Australian Pastoralists' Review*, and we recommend a careful perusal of it to farmers who have become habituated to sticking to two or three crops, and

persistently ignoring the possibilities presented by other crops equally, if not more remunerative, advising them at the same time to go in and do likewise:—

Splendid flax fibre for cordage purposes can be produced from a crop which has been allowed to mature its seed, a thing which is never permitted in the old country. During a very practical lecture delivered by Mr. Joseph Knight, Government Agricultural Expert, at Warrnambool, recently, he showed a large number of samples of flax fibre and linseed, nearly all produced in Victoria. Amongst these was a sample of Irish flax sent out by Mr. Sinclair, the department's representative in London. This was placed alongside a sample grown at Calignee, in Gippsland. The two samples were considered to be of equal quality. The English price of the fibre which the Irish sample represented was £52 per ton, whilst the Victorian fibre was purchased for manufacturing purposes in Melbourne at £42 per ton, and would probably be worth the higher figure in England. The seed from the crop which produced the Victorian sample had been allowed to mature and was harvested, thus adding to the return to the farmer without rendering the quality of the fibre any worse than that of the best Irish fibre grown for similar purposes. This Victorian sample had been dew-retted, another departure from the Irish system, and a method of treatment which has proved successful out here. By this plan the flax straw, instead of being placed in specially prepared pits, filled with water, to steep, as in Ireland, is simply laid out in rows in a grassy plot. The rain and dew falling on it ret it thoroughly in from four to five weeks, once turning it over during that period being all the extra handling required. Another method which has been adopted here with success, and which would be looked upon as a most extraordinary proceeding by the Irish producers, is the cutting of the crop with the reaper and binder. In Ireland all the flax is pulled up by the roots by hand and tied in sheaves. The cost of this is, of course, considerable. As the fibre does not commence to enclose the plant until from 2 to 3 inches up from the ground, the present-day reaper and binder can cut the crop so as to leave at the most an inconsiderable amount of fibre behind. Both methods of harvesting have been tried here, and, as the cutting can be done successfully at such a great reduction in the cost as compared to that of pulling, it has superseded the other method.

Some of the early attempts at flax-growing in Victoria have resulted badly owing to the growers not attempting to treat the fibre. They grew it simply for the seed and the Government bonus of £2 per acre, and burned or otherwise disposed of the straw. Those who have taken the industry up in earnest and have treated the crop so as to get all the return possible from it have found it pays handsomely.

The experience of Messrs. Woolfe Bros., of Traralgon, who have grown flax for some years, may be cited as an instance. Messrs. Woolfe Bros. have at present a crop of 70 acres growing near Traralgon. From figures supplied by them, based on their actual experience of results, the following estimate is made:—

COST OF PRODUCTION PER ACRE.				GROSS RETURN.			
		£	s. d.			£	s. d.
1½ bushels seed, at 4s. 6d.		0	6 9	6 cwt. fibre, at £2		12	0 0
Ploughing, harrowing, sowing		0	13 3	1 cwt. tow, at 10s.		0	10 0
Weeding, 3s. ; pulling, 25s. ; carting				12 bushels seed, at 4s. 5d.		2	14 0
and stacking, 4s. ; threshing, 15s. ;							
spreading for retting, 15s. ; turning,							
2s. ; gathering and stacking, 12s.		3	16 0				
Breaking and scutching, at 2s. for							
stone of fibre (6 cwt. fibre per acre)		4	16 0				
		£9	12 0			£15	4 0

The rent of land and freight to market on the produce are not here taken into account. A net return is shown of £5 12s. per acre, and, as this estimate

provides for harvesting the crop by pulling, a still better result would be shown with the new system of cutting with reaper and binder. The Government bonus of £2 per acre for a crop of flax grown, the seed from which is ultimately converted into oil or the flax made into fibre, also that of £5 per ton on flax fibre manufactured, would add to the return respectively £2 and £1 10s., or a total Government bonus of £3 10s. per acre, thus giving a total net return of £9 2s. per acre. Messrs. Woolfe Bros. have such faith in the industry that they have intimated their intention of putting in 200 acres of flax next season.

FATAL EFFECTS OF YOUNG SORGHUM.

Mr. C. O'Brien, of Moggill, has experienced very unfortunate results owing to his cows having grazed for an hour in a field of young sorghum. The original crop had been cut, and the stools had apparently died off during the dry weather. The cows grazed in the field for a long time on the weeds and grasses. When the rain came, in the middle of November—the cows having been removed from the paddock previously—the young sorghum started to grow, and when it was barely 6 inches high, Mr. O'Brien, thinking that the cows would have some good picking in the young greenstuff, turned them into the field. The rain came on the 17th; the sorghum was eaten by the cattle on the 20th; and by the evening twelve had died. Now, the fact that the feed was only a few inches high utterly confutes the statements of those who maintain that the poison is contained in the joints of the plant, for these young plants had not yet made a joint. The deaths are not attributable to hoven, for the cattle were not swollen, neither was there a sufficient growth to enable them to gorge themselves with it. So much evidence has been given of deaths being traceable directly to sorghum in all its stages, that the subject becomes one of almost national importance, and is deserving of searching investigation into the cause of the death of so many valuable domestic animals.

COAL ASHES FOR TOMATOES.

In one of our suburban gardens there is at present growing a tomato bush 14 feet high, trained to a fence. Other tomato plants are in the garden, but they only grew to a height of 5 or 6 feet, although well manured. This particular plant was not manured, as it grew in hard ground outside the fence, and worked its way to the inside. The grower could explain nothing about it. We find in the *Tropical Agriculturist*, Colombo, the following, taken from "Johnson's Gardener's Dictionary":—

Coal ashes are generally conceded to be deficient of manurial constituents—at least of ammonia. According to "Johnson's Gardener's Dictionary," however, coal ashes contain carbon, silica, alumin, sulphate of lime, iron and potash, carbonate of lime, and oxide of iron, and are said to be a good manure for grass, peas, and potatoes. Thus the assimilation of some if not all of these constituents is likewise beneficial to the tomato, and probably in a marked degree. The relation of a case in point may go far to prove this. It was experienced by my brother when resident at Rhode Island, New York. Having no further use for a brick-built pit used for plunging half-hardy plants in pots in during the winter, it occurred to him to add more furnace ashes to the pit, and plant tomatoes therein. A shovelful of fresh cow manure was the only additional stimulant added, merely placing it beneath each plant, returning the ashes to each hole, and then placing a plant on the spot, and when the plants became fully established the hose was freely applied during the summer, resulting in a heavy crop of fruit of fine size and quality; some of the plants extended to 18 feet in length year after year in the selfsame ashes, much to the astonishment of the neighbouring gardeners. Moreover, the "spot" or

"sleepy" disease never made its appearance. I must state that the long deep pit was filled up the depth of 5 feet within 18 inches from the top, thus leaving space for wintering bedding stock, and a single tomato plant was allotted to each sash space. Whilst, of course, the ashes were not required for the tomatoes during the summer and autumn seasons, long laths were laid over the pit to train the plants on. The cow manure, of course, afforded a stimulant for the young plants. I have seen the advantage of coal ashes for tomatoes mentioned in the *Journal of Horticulture* by, I think, Mr. Iggulden, and the testimony I give may tend to increase their use.

Were another case in point needed to prove the efficacy of coal ashes, I may instance that by an amateur grower of Zonal Pelargoniums, and whose success was remarkable with plants grown in 4-inch pots. The plants were grown in pure turfy loam, with perhaps a little leaf mould added; but nothing in the shape of manure was given afterwards, simply pure water. The roots, however, in due course penetrated through the bottom of the pots, and then completely permeated the layer of coal ashes spread over the staging up which the plants were arranged.—W. G., *Journal of Horticulture and Cottage Gardener*, September 6.

On reading the above, we examined the spot where the tomato in question was growing, and found that the soil consisted of old bricks, broken asphalt, and lumps of coal ash and charcoal. The fruit on this particular plant is of good size, clean, with no sign of disease, whilst much of the fruit on the others was badly affected, and most of the plants died off. Another case came under our notice at the old Mount Hogan diggings, in Northern Queensland. The place had been abandoned at the time, and in looking over the machine site we found some immense tomatoes quite ripe growing on plants which had sprung from the ash heap from the engine. Tomato-growers might experiment, and make the results public for the benefit of others.

PLANTING POTATOES.

The Americans, always alive to the necessity for economy and efficiency in agricultural operations, no longer plant and cultivate potatoes by hand. The whole of the work of cutting the tubers, planting, cultivating, and harvesting the crop is done entirely by machinery and horses.

GROUND BONES.

A Dutch writer discusses ground bone as compared with superphosphate and Thomas' phosphate as sources of phosphoric acid. Notwithstanding the claims of investigators that ground bone is inferior to other sources of phosphoric acid for fertilisers, the former remains popular with farmers, especially in England. The author thought it desirable that field experiments extending over more than one year should be undertaken in order to determine the effect of the bonemeal during the second year. For such an experiment a piece of sandy loam was selected, and divided into ten parts, each 50 square metres in size. The entire field was fertilised with 250 kg. of sulphate of ammonia (20 per cent N_2O) per hectare, in order to ensure the presence of an abundance of nitrogen and potash. In the spring of 1898 the whole field received nitrate of soda at the rate of 300 kg. per hectare. Two of the plats received no phosphate, while to the others were applied superphosphate, Thomas' slag, bonemeal with the fat removed, and bonemeal with the gelatin removed. In each case enough of the phosphatic fertiliser was used to make 100 kg. of phosphoric acid per hectare. Rye was planted on all the plats in November, 1897, and in the spring of 1898 the stand was very satisfactory.

The rye was harvested in August, 1898, and peas planted for the following crop. For this crop no fertilisers were used. The increase in grain for the plats receiving phosphates over those receiving no phosphates was for the two years as follows:—

Increase in yield due to different phosphates.

			Rye. Kg.		Peas. Kg.
Superphosphates	...	...	476	...	950
Thomas' phosphates	...	...	600	...	550
Bonemeal (fat removed)	...	...	375	...	1,250
Bonemeal (gelatin removed)	...	...	750	...	1,600

NOTE.—1 kilogramme=2·20 lb. ; 1 metre=3·2 ft. ; 1 hectare=2 $\frac{2}{5}$ acres ; 1 centimetre= $\frac{2}{5}$ in.

In every case the results showed that on light soils the bonemeal is in the long run equal at least to superphosphate and Thomas' slag.—*Planting Opinion.*

HOW TO UTILISE FOWL MANURE.

Not long ago a farmer sold twenty-five sacks of fowl manure at 1s. per sack. This same farmer complained that for want of manure he could not raise decent vegetables. Will some men ever learn wisdom? See what could have been done with those twenty-five sacks of valuable manure. It could have been made into 300 bushels of what *Country Life* calls "home-made guano of unequalled excellence." The following is the method of preparing it:—Spread a layer of dry swamp muck (the blacker it is the better) on your barn floor, and dump on it the whole of your fowl manure; beat it into a fine powder with the back of your spade; this done, add hardwood ashes and plaster (gypsum), so that the compound shall be composed of the following portions:—

Dried muck, 3 bushels
Fowl manure, 2 bushels
Ashes, 1 bushel
Plaster, 1 $\frac{1}{2}$ bushels.

Mix thoroughly and spare no labour; for in this matter the elbow-grease expended will be well paid for. A little before planting moisten the heap with water or, better still, with urine, cover well over with old mats, and let it lie till wanted for use. Apply it to beans, corn, or potatoes at the rate of a handful to a hill, and mix with the soil before dropping the seed. This will be found the best substitute for guano ever invented, and may be depended on for bringing great crops of turnips, corn, potatoes, &c.

We give this as absolutely reliable from practical experience. We found the best way to apply the mixture is to place about 2 lb. of the mixture in a hole, watering it well. Then mix it well with loose soil, cover with three or four inches of soil, and in this sow the seeds, watering in the evening with a solution of the guano, 1 lb. to 4 gallons of water. For vegetable marrows there is no manure to equal it.

LIME AS A MANURE.

By W. SOUTTER.

Although in Queensland the application of lime to the soil is not generally a necessity recognised by the average farmer, still many of our heavy black soils would be immensely benefited by an application of this mineral. Lime in itself is of very little value as a fertiliser or as a direct agent in supplying plant food; still it exercises a beneficial influence upon the land by rendering many of the latent fixed plant foods available.

It is a mistake to apply a large dressing of lime at one time. A little and often is the correct thing. In olden times 100 bushels of slaked lime per acre was considered a fair dressing, but subsequent experiments carefully carried out, and results noted, prove that 25 bushels per acre is ample when frequency of applications is observed. In addition to the quantity applied, there is one other important feature to be observed—namely, the manner in which the lime is applied.

Like every other ingredient, lime requires to be handled with judgment. It must be borne in mind that lime sinks into the soil. It is, therefore, unwise and unnecessary to hurry it by ploughing it in; it should be sprinkled over the surface, and lightly harrowed in.

It must also be remembered that lime in its caustic state (quicklime) exercises a very powerful influence, both physically and chemically, upon the soil. And it should always be applied in this state, and be harrowed in as soon after the application as possible. Lime should always be slaked with water in preference to any other agent, water being the quickest means of breaking it down. All other methods are too slow, and admit of too much carbonic acid being absorbed, thus changing the lime back into carbonate, which is practically the form it assumed prior to being burned.

The best time to apply lime to our soils in this country is in early winter before the wheat-sowing season.

And let farmers be advised that the application of 25 bushels per acre in two successive seasons will give much better results than one dressing of 100 bushels in one lot. Spread thin, harrow in, and good results must follow. The price of stone lime per ton ready for slaking runs between 5s. and 6s., including bags, f.o.b. in Brisbane.

ENSILAGE-MAKING.

By AUBIN DOWLING, Talgai West.

There is no subject more worthy of the attention of our farmers, and more especially of our dairy farmers, than that of conserving, in years of plenty, sufficient fodder to tide them over the lean years that are sure to follow. By far the best and cheapest way to store it is in the form of silage, as fodder cured in this way retains all the valuable constituents that in the process of converting it into hay are thrown off into the air, and its digestibility is thus impaired.

Manby Miles, an American writer, in his book on "Ensilage" says:—

"When green grass or clover, approaching to maturity, is first cut down, it contains a considerable portion of starch, sugar, and gum, still unchanged into woody fibre, as it would mostly be were the plant allowed to become fully ripe. But, when left to dry in the open air, the circulation proceeds to a certain extent, and, under the influence of light, woody fibre continues to be formed until it becomes completely dry.

"The effect of this change will obviously be to render the dry hay less digestible on the whole, and consequently less valuable as food than the green stuff from which it was produced.

"Again, we know that, by drying, many very digestible and nourishing substances become less soluble, and consequently more difficult of digestion; hence a large portion of the really nutritive matter of their food is rejected in the droppings of animals which are fed upon them."

The inquiry, therefore, which the practical farmer ought to make is by what method should he store his crops so as to retain as much as possible of their feeding value.

WHAT CROPS TO GROW.

Ensilage has been made from a great deal of what might be called the waste products of a farm, such as thistles, rank growths of grass, and herbage. But my principal object in writing this paper is to encourage a regular system

of ensilage-making amongst our dairy farmers, and it is not likely that this would be achieved when stacks or silos would only be filled at periods when large supplies of waste products are at hand.

The dairy farmer, therefore, who would be prepared for every emergency, must sow a crop specially for the purpose, and there is no other crop equal to maize. It is a crop that can be very easily grown in all parts of Queensland, and it yields a large amount of fodder—from 8 to 12 tons to the acre.

It has often been conceded that maize for silage purposes should be sown broadcast, but my experience is decidedly against such methods of planting. It not only requires more seed, but the plants grow spindly and irregular, and don't mature properly, and the land cannot be kept free from weeds except by hand labour, which is too expensive. It also entails a great deal more labour to cut and cart to the silo when sown broadcast than when sown in drills.

The drills should be 4 feet apart, and the plants from 8 to 12 inches apart in the rows.

The land can then be stirred and kept free from weeds with a Planet Jr. cultivator. Maize intended for ensilage should be planted much more thickly than when intended for seed, as the thicker the stand of the crop the larger the proportion of stalks and foliage to seed.

Last season at Talgai West we planted maize thickly in rows 4 feet apart. Then, as soon as it began to tassel, we thinned it out with cane-knives to about 1 foot between each plant, leaving those plants standing that were likely to produce the best ears, and carted away the stalks we had cut out, and made a splendid stack of ensilage. We cut down two rows clean out about every 20 yards. This left a clear track for the drays to go through, and the men went in on either side and put the thinned-out stalks on to the drays. A fair crop of seed was afterwards taken from the stalks that had been left to mature.

A STACK OF ENSILAGE WITHOUT PRESSURE.

There is a very general opinion that the making of good ensilage is too costly to come within the reach of the ordinary dairy farmer.

I will now endeavour to show that good ensilage can be made in a stack without any artificial pressure, and that it is no more costly or troublesome to make than hay.

A sample of ensilage made in this way was exhibited by me at the late Toowoomba and Brisbane Shows, and no doubt seen by many who will read this article; and this is how we set about it:—

The foundation was of logs round the outside, and the intervening space filled in with broken stones and gravel with a layer of straw over the gravel. This would raise the foundation about 1 foot from the surface of the ground, and allow all surplus moisture to drain away. There was no more labour involved in this than with an ordinary haystack foundation, the usual array of levers and ropes for increasing the pressure being entirely dispensed with.

In building, commence at one end and lay the stalks with the butt end outwards, great care being taken to make the stack as square and solid and plumb on the outside as possible, by which means the greatest pressure by the material itself is produced and the air is more effectually kept out. When the stack had reached a height of about 10 feet, we spelled a day to let it sink. When it becomes too high to lift the stuff on to it from the drays, an ordinary jib is fixed, worked by a horse, and the stack can be built to any height that the jib will lift the stuff up to.

The stalks, when cut in the field, must be laid in bundles with butts all facing the same way. This greatly facilitates loading, and also makes it easier and quicker for the stackbuilder. The cut stalks are carted as quickly as possible to the stack, which should be in some central position—that is to say, as near as possible to where the crops are grown, and also convenient for feeding out to the stock, in order to save expense in hauling, as ensilage is very heavy stuff to handle.

We made no attempt at any time to gauge the heat of the stack. When the latter was finished, we put a load of straw on top, with a couple of wires, weighted with stones to keep the straw from blowing off. No artificial pressure of any kind was applied. We did not use any covering, except the straw, as above, although this might be desirable where there is much rain.

The result was beautiful ensilage with only about 1 foot of waste on the outside, and even this was picked over by the pigs. There are various methods of making ensilage, and to those who can afford it there is nothing like a good silo building where the stuff is chaffed before being put in, as there is then no waste. But buildings are not within the means of small farmers, and to such the experiences of one who achieved success by a simple method that did not involve more labour and expense than making hay will, I hope, prove instructive.

Only last year thousands of tons of maize that, from the adverse season, did not mature into grain, were utterly lost, or the cows and horses were turned into it to trample down more than they ate. And the same maize, had it been conserved as ensilage, would now be worth ten times its cost to feed to the stock in this season of drought.

THE PRICE OF WHEAT.

PROSPECTS OF THE CROP.

From the *Warwick Examiner and Times* we learn that the directors of the Warwick Farmers' Milling Company fixed the price of wheat at their meeting on Saturday last (1st December). It was decided to pay 2s. 7d. per bushel (bags included) for wheat delivered at the mill, with an allowance of 1d. per sack for new bags. Gristing operations were resumed at the mill on Saturday.

Operations are already reported in the Toowoomba wheat market (says the *Darling Downs Gazette*). Of course the market can hardly be said to be yet formed, and quotation may be premature. Two shillings and sixpence is roughly the price at present, and lots of Downs wheat have been already bought, and no doubt further quantities will be bought at this price.

During last season samples of the famous Manitoba wheat were distributed among the farmers by the Dominion Milling Company to afford an opportunity of testing it on the Downs. This seed was originally brought from Canada, and was acclimatised in New South Wales. The flour from this wheat commands from £4 per ton more than that from other wheats in the Canadian market. It was distributed somewhat late, but excellent results are reported. In one case a farmer who secured two bags of seed has threshed sixty bags of good grain, a very fine yield. It is to be hoped further good results may be heard of, and that the enterprise of the Dominion Mill in securing the seed will result in a decidedly increased gain to the wheat-growers on the Downs.

THE PROBABLE WHEAT YIELD.

Mr. F. Kates, M.L.A., finds it necessary to double the size of his large grain shed at Allora, owing to the heavy yield of this season. Mr. Kates calculates that over 1,250,000 bushels will be the output of the Darling Downs this year. Moreover, he says, the quality is good, and the grain sound and dry. Mr. Kates says that, in the interests of the great wheat and dairying industries, the Government should, without any delay, repurchase Gowrie, Felton, and Goomburra, every acre of which will be rapidly selected by a most deserving class of people.

The *Courier's* Downs correspondent says it is not improbable that the total yield on the Downs will be a record one. In some cases threshing has resulted in a return of 10 bags, or 40 bushels, to the acre; and in one or two instances the yield has reached as high as 52 bushels. In the Allora district, including Goomburra, Toolburra, and Pratten, it is estimated that there are about 18,000 or 20,000 acres under cultivation, and it is probable that the average yield will be about 20 bushels to the acre. If the estimate turns out to be correct, the total yield in the Allora district will reach something like 400,000 bushels.

A return laid on the table of the New South Wales Assembly shows that 127,053,804 bushels of wheat have been exported from the States forming the Australian Commonwealth during the past twenty years. About 10,600,000 bushels have been imported. The production in 1880 was 28,730,159 bushels, and in 1899 41,417,853 bushels.—*Warwick Examiner and Times*.

THE FARM AND DAIRY INDUSTRIES OF AMERICA.

Mr. Charles Sealey, of "Trelawney," Harrisville, who has lately returned from an extended tour through Canada and the United States, has furnished the following interesting report of his experiences to the Honourable the Secretary for Agriculture:—

I sailed by the Canadian Australian Royal Mail Line between Brisbane and Vancouver, calling at Honolulu and Victoria. From Vancouver I passed through British Columbia, North-west Territory, Manitoba, and Ontario in the Dominion of Canada; thence through the States of New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, Iowa, Nebraska, Wyoming, Idaho, Oregon, and Washington in the United States.

It was not until I reached the southern portion of Ontario that mixed farming became general, and, being anxious to spend as much time as possible in the States where dairy produce and maize were the chief productions, I spent two months in New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, and Iowa, where I saw a great deal to interest me, maize being the chief crop in these States, although wheat, oats, root crops, and clover are largely grown.

The majority of the holdings are small, ranging from 70 to 100 acres, and values range from £10 to £50 per acre, according to position and quality of land.

The farm homesteads and barns, are, as a rule, good, denoting comfort and prosperity.

The American farms his land well, as well as bestowing great care and attention on his cattle, and also in preserving large quantities of cattle fodder, which we allow to go to waste.

MAIZE-GROWING.

In the States I visited, the farmers, as a rule, work small teams, and plough their land with steel beam walking ploughs, single and double furrow riding gang ploughs; and cultivate with disc harrows, spring-tooth cultivators, pulverisers, and ordinary iron harrows; and before planting they get the land into a better state of tilth than is usually the case in the colonies.

They have long since abandoned the old-fashioned method of planting corn, almost universal with us, by striking drills with a plough, and dropping the seed by hand, and covering with a harrow or scuffler.

There are now the two methods—one known as "listing,"* the other "check row planting": By the former method one man with a two-horse team opens one drill at a time, plants the corn from 6 to 12 inches apart as desired, and covers it in one operation, at a depth of from 6 to 8 inches; doing about 7 acres per day. By the latter method, "check row planting," one man with

* Listing was described in the *Q.A.J.*, 1st December, 1900.

a two-horse team drills, plants, and covers two rows at a time, planting an area of from 12 to 15 acres per day. This method has the advantage of dropping the two or three seeds together at equal distances every 3 feet, thus making transverse drills, and affording the farmer a very much better opportunity to keep his land clean than any other known method of planting.

The advantage which "listing" has over the check row planting is in depositing the seed in the soil at a greater depth, and for this reason will probably come into greater favour in this climate.

After planting, the first implement used is the "spring-tooth weeder." This implement, practically a light harrow or rake, is made from 12 to 15 feet wide, with several rows of long spring teeth, keeps the surface of the ground loose, and destroys all young weeds coming through the ground, and does little or no harm to the corn until several inches high, and will cultivate an area of 25 acres per day.

When the corn is 5 or 6 inches above ground, the shovel-tooth cultivator is brought into use. This implement is mounted on a pair of high wheels with seat for driver, and is drawn by two horses. It might otherwise be described as a "duplex scuffer."

The horses are usually muzzled, one walking on each side of the corn row, and the driver riding directly over the top of the row, with a foot on each half of the cultivator, thus cultivating a row at a time, and with his feet steering each half of the cultivator as near to the corn row as desired.

In this way the land is cultivated until the corn is too high to allow a team to be used, and it usually remains loose on the surface, and free from weeds until fit for harvest.

The implements described are manufactured by Messrs. Fuller and Johnson at their extensive works in Madison (Wisconsin), also by a number of other American manufacturers.

A few farmers here have made it their business to provide themselves with the latest improved implements, but generally our Queensland farmers are not so provided, and, until they are, I am of opinion that maize will not be produced here as cheaply as in the States.

The smallest farmers in America are well provided with implements, and would be glad to obtain such prices as rule here for their maize.

SHREDDED CORN FODDER.

When the stalk is beginning to turn yellow and the grain commencing to dent, although the leaves are still green, the crop is ready to harvest. Sometimes it is cut by hand with a corn-knife and put into bundles; but usually a "corn-harvesting" machine is used, and the corn is cut, bound into sheaves, and stooked up in the field to dry, being thus left for a period of three to five weeks.

The "corn-harvesters" most highly spoken of were made by the McCormick Harvesting Machine Company, of Chicago, also by the Deering Company and others.

The stooks of corn are usually put up in straight lines across the field, leaving some fifty yards of space between each row of stooks, so that this land may be ploughed while the corn is drying, and the narrow strips of land on which the stooks stand are ploughed as soon as the corn is removed.

As soon as dry enough, the sheaves are carted to the barn, and passed through a machine known as a "fodder-shredder." This machine takes off the cobs, and delivers them husked ready for shelling or grinding into corn and cob meal, and at the same time tears the stalks, husks, and leaves into shredded

fodder, and delivers this product to any height desired through an inclined tube by wind force, and is stored in the barns over the cattle-sheds or built into stacks. The American farmer speaks very highly of this fodder, and without doubt it makes an excellent winter dry feed for cattle.

CORN SILAGE.

The corn is usually cut a little earlier for silage than is necessary for corn fodder, and is harvested in sheaves with a corn-harvester in the same manner as described for corn fodder; only in this case, as soon as cut, the sheaves are taken to the silo, there cut into chaff, in lengths varying from $\frac{1}{2}$ -inch to 1 inch as desired by the silage-cutter, and delivered into the top of the silo by an elevator. These elevators are usually made of two endless parallel chains, with wood laths across; but it is thought that this system will soon give way to the forced air tube, which is being used for elevating shredded fodder. The silage is delivered on the pointed top of a light frame of wood, made in the shape of a bell which spreads the fodder, and causes it to fall around the inside of the silo, so that one man is sufficient in the silo to level and tramp down evenly. When the silo has been filled, a layer of chaffed straw is usually placed on the top, and watered. This soon mildews into an air-tight mass, and makes a very efficient covering.

In some instances, shredded silage is being put up in place of chaffed silage, and this is strongly commended by those who have tried it. The old method of weighting the silage has been abandoned.

THE SILO.

I saw a great variety of silos, both above and below ground—built of stone, brick, wood, and iron; in shape, square, hexagon, and cylindrical. The latter, built of wood and above ground, is the one which appeared to me to be most in favour, and I noted particularly their construction. They are built in two ways—first, by erecting upright studs for a circular wall on a prepared foundation, boarding the outside with weather-boards, then lining the inside with 4-inch by $\frac{1}{2}$ -inch pine, covering this with a layer of waterproof paper, and again lining with 4-inch by $\frac{1}{2}$ -inch pine over the paper, after which the whole of the inside is lathed and plastered. The cost of erecting this class of silo will, I believe, prevent it from coming into general use in these colonies.

The latest class of round silo is known as the stave silo, and is built of 4-inch by 2-inch wooden staves like a huge cask, and hooped with strong round iron hoops, the ends of which are provided with a long thread and heavy nut, so that they may be tightened or slackened from time to time as required.

If the staves are dipped into boiling tar, or painted with tar before erecting, the stave silo will be found durable, effective, and less expensive to erect than any other.

CORN SILAGE.

In the minds of American dairymen there is no doubt as to the value of corn silage, and many thousands of silos are filled, and the contents fed to cattle and sheep annually.

Wheaten bran, with corn silage, is largely fed to milch cows; but where lucerne can be grown, lucerne hay takes the place of wheaten bran.

Amongst the farms I visited in Michigan was that of Mr. A. M. Welch, of Ionia, from whom I obtained a few figures with respect to his herd.

Records had only been kept since 1st April of this year, so that only a period covering four months was available. From 1st April till 31st July, Mr. Welch milked 43 cows, including 11 two-year-old heifers, giving a yield of 135,497 lb. of milk, averaging 4.54 per cent. butter fat. Among this little herd were 9 purebred Shorthorns, 5 Jerseys, and 2 Guernseys, the balance

being crossbred cattle. Individual records were only kept of the pure breeds, which were as follow:—

MILK RECORD FROM 1ST APRIL TO 30TH JULY, 1900, INCLUSIVE, OF A. M. WELCH'S DAIRY HERD
IONIA, MICHIGAN, U.S.A.

Name of Cow.	April.	May.	June.	July.	Test.	Total.
SHORTHORNS.						
Straddle	1,551	1,611	1,399½	1,224	4·	5,785½
Brockle	1,389½	1,592½	1,434½	1,234	4·	5,650½
Shorty	1,338½	1,491½	1,436	1,226½	3·45	5,492½
Wolvertin	1,405	1,349	1,179½	1,037	3·7	4,970½
Dake	1,169½	1,186½	1,121½	1,036	3·9	4,513½
Madison	961½	1,294½	1,138½	1,042	3·6	4,436½
Michigan	904	1,023½	1,005½	891½	4·	3,824½
Red Nell	950	1,003	931½	786	4·2	3,670½
Spot	858	998	854	579	4·85	3,289
JERSEYS.						
Cutler	907½	947	906½	800	4·	3,561
Straight Horn	826	976	848½	762	5·2	3,412½
Lassie	702½	812	751	697	4·8	2,962½
Cornell	688	730½	697½	655	5·2	2,771
Old Nell	707	725	646½	597	4·65	2,675½
GUERNSEYS						
Slivers	700	734½	662	635	4·1	2,732
Zoe	733½	699½	647	534	5·7	2,614
RECORD OF HERD DURING ABOVE PERIOD.						
	30,027	35,760	35,735	33,975	...	135,497

Average number of cows milked, 43 ; including 11 two-year old heifers.
Average test of herd, 4·54 per cent.

From the above record, it is shown that the Shorthorns gave the largest yield, while the Jerseys and Guernseys gave the highest percentage of butter fat, and the splendid test of 4·54 per cent for the whole 43 cows, among which were 11 heifers, two years old, speaks for the care bestowed on the cattle. Mr. Welch speaks highly of shredded corn fodder—he has three large silos, and states that without corn silage he would be unable to carry on dairying successfully.

In addition to his dairying operations, Mr. Welch buys 1,000 crossbred lambs in the autumn, shears and sells them fat in the spring. These sheep are housed all the time from six to seven months, and are fed on corn silage, shredded corn fodder, and clover hay ; and when fattening after shearing, grain is added to the ration.

The sheep barns are so conveniently arranged, and the silage and shredded fodder so cheaply put up, that I see no reason why farmers in these colonies should not benefit by fattening sheep when corn silage and shredded fodder become general products of the farm.

Another farm which interested me very much was that of Mr. H. B. Gurler, of De Kalb (Illinois), comprising 400 acres, 150 acres being under maize, 70 acres under oats, and the balance pasture. Mr. Gurler has about 225 head of cattle, including calves, and some 16 to 20 horses on the farm. He milks 150 cows all the year round, and feeds chiefly on corn silage. He has six large silos, as follows:—

- 3 Silos, 38 feet diameter by 20 feet high.
1 Silo, 38 " " 24 "
2 Silos, 28 " " 24 "

The cows are fed and milked in three barns, housing 50 cows each, and each cow's milk is weighed twice daily separately and her records kept. The whole of this herd have been dehorned ; in fact, all the dairy cattle I saw were dehorned, and I think we would benefit considerably by dehorning our dairy

cattle in these colonies. The operation of dehorning—which is almost instantaneous—is performed by an instrument made specially for the purpose, and generally when the cattle are two years old or more. The hair round the root of the horn being smeared back with vaseline, the horn is cut off close to the head, and the hair then smeared back over the stump. Iodiform mixed with oil is sometimes used in place of vaseline. When cattle are dehorned they yard and house better, and do not ill-treat each other, so that they do better generally.

DAIRY FACTORIES.

There are hundreds of butter and cheese factories in the States, and a few condensed milk factories. In my opinion the butter and cheese factories in our own colonies are quite up to date, and turn out a product quite equal, if not superior, to the American factories—that is, in regard to butter and Cheddar cheese; but with the immense population in the States there is a big demand among the great hotels and wealthy people for what is generally termed high-class cheese, such as Swiss, Limburger, Stilton, &c., and a considerable quantity of this class of cheese is manufactured.

I am of opinion that when the demand arises these goods will be successfully manufactured here. Referring particularly to butter, I did not taste any which I would consider superior to that made by the factories in this colony.

In condensed milk factories, I believe there are about thirty which have proved successful, while a greater number have failed.

In the Northern States and in Canada these factories have been most successful, as the climatic conditions are more favourable there, but even in these parts some of the factories close down during the summer months.

I inquired particularly into the manufacture of this product, and found that most of the factories objected to milk produced from cows fed on silage, turnips, cabbage, carrots, or any other food liable to leave a taint in the milk or strong smell in the cow barns. The barns and yards must be kept absolutely clean and whitewashed regularly. The cows' udders should be washed with warm water, and dried before milking. The milker should be very clean; the milk pail fitted with a short spout with removable cap, the cap only being removed while the pail is being emptied; and the top of the pail fitted with a fine cloth strainer, so that the milk is strained as it passes from the cow to the pail.

At one of the large dairies I visited the strainers were made of four thicknesses of cheese cloth, with a layer of cotton wool between. As each cow was milked, her milk was taken a short distance from the barn, aerated at once, and reduced to a temperature of 50 degrees Fahr. before being delivered at the factory.

The milk pails and factory cans should be seamless, and—in conjunction with the strainers—kept scrupulously clean.

I am of opinion that where a factory proprietor owns a dairy herd, and has his cows milked under his own supervision, condensed milk of a sound, keeping quality may be made in these colonies, and in time dairy farmers adjacent to such factories will, under the supervision of inspectors appointed by the factories, conform to the rules laid down by the factory proprietors, and deliver milk in the necessary condition.

AGRICULTURAL COLLEGES.

I visited the Michigan Agricultural College at Lansing, also the Wisconsin Agricultural College at Madison. These institutions are splendidly maintained, and it is claimed that they are doing a great deal for the advancement of agriculture.

From my own observations I must say that any lad attending these colleges, and who is anxious to become proficient in scientific agriculture and dairying, has every facility for so doing.

A new departure has recently been made at the Wisconsin College in the form of short courses in agriculture during winter months. These courses are intended for and attended almost exclusively by farmers' sons for a period of twelve weeks, commencing about the second week in November, and closing about the second week in February; and the cost for college fees, board, &c., amounts to about £12 12s. for the course.

The short course in agriculture for 1899 and 1900 was attended by 252 students, and the dairy course by 120 students.

Dr. Babcock and Professors Carlyle, Farrington, and Moore, whom I met, spoke highly of the short-course system; for in America, as here, a great number of farmers' sons become dissatisfied with their surroundings, and seek employment in the cities, and it is believed that the short courses in agriculture are doing a lot toward rectifying this evil. These young men, though unable to attend the college through the busy part of the year, are able to attend the midwinter short courses, and, as a general rule, become close students, and, the scientific knowledge thus gained gives them renewed interest in home affairs.

The Hon. W. D. Hoard, proprietor of the well-known journal, *Hoard's Dairyman*, and one of the greatest authorities on dairying, whom I met at Fort Atkinson, spoke very highly of the short courses in agriculture at the Wisconsin College. Mr. Hoard says—and I agree with him—that it is the farmers' sons we should endeavour to keep upon the land, and the short courses in agriculture are the best means we can discover to arouse in them an increased interest in their daily avocations.

Mr. Hoard is a gentleman possessing a vast experience in and knowledge of the farm and dairy industry, and his conversation on all matters pertaining thereto is most interesting and instructive.

While speaking to Professor Farrington, of the Wisconsin College, on dairy matters, he explained to me a milk-test which he had designed for the purpose of discovering gaseous impurities in milk delivered at factories or creameries. It is a very simple contrivance, and found very useful, particularly in cheese factories. It consists of a tin box, 12 inches long by 8 inches wide, and 6 inches deep, open at the top, with a hand grip on each end, and a loose tin cover, perforated with small holes. Into this box is filled two dozen cylindrical tins, 6 inches deep and 2 inches in diameter, and open at the top, similar to coffee tins with the lids off. These small cylinders are filled with samples of milks from suppliers, a teaspoonful of rennet added, and then placed in the box, the box being placed in a moderately warm position, so that the milk will solidify into curd; the perforated tin cover is placed on, and the wooden cover on the top. When the milk has solidified, the wooden cover is removed, and the box with its contents turned upside down to drain through the perforated tin cover. About two hours later the tin box is removed, and the two dozen tin cylinders lifted off, leaving the curd in each in perfect shape like small cheese; each of these are sliced in two with a sharp knife, and any taint or gaseous impurities are immediately detected. The samples of curd showing a clean, smooth surface where cut are from pure milk, while the curd showing a mass of small holes on the cut surface denotes gaseous impurities. The farmer at fault is then requested to deliver separate samples from each cow, and these are tested in the same manner, and the faulty cow is discovered; or if all his samples should prove impure, then the fault is with the food or drink his cows are consuming or with their surroundings, and this must be rectified.

Although this test is very simple, I had not previously heard of it in these colonies, and on mentioning it to some of our leading dairy factory supply companies found it was unknown to them. I think this test will be found very useful in this climate, and, when brought into general use amongst farmers who work separators of their own, our exporting factories could depend upon receiving purer cream to manipulate.

AMERICAN METHODS.

Owing to the great difference in climate, it would be no advantage to us to entirely adopt American methods, but much good would accrue to the colony in partially adopting them.

The American puts up a large quantity of corn silage and shredded fodder in the summer, as he cannot grow green crops in the winter. Thus we have a great advantage over the American dairyman, but, on the other hand, it frequently happens that we experience a dry autumn, when we cannot grow the necessary green crops for winter feed, and this resolves itself into the question of whether it is cheaper for us to irrigate the land, in order to grow green crops in dry seasons, or to store silage and shredded fodder in a good season without irrigation?

It not unfrequently happens with us that a hot dry spell sets in, when maize has almost reached the cobbing stage, and from a grain point of view the crop is a failure, therefore a dead loss to the farmer, but if converted into shredded fodder or silage this loss would be averted. At present the farmer cannot avoid loss, as, in the majority of cases, he cannot afford to purchase corn-harvesters, fodder-shredders, and silage-cutters, but the proprietors of portable threshing-machine plants would only be too willing to increase their business and possess themselves of these machines if farmers offered the inducement so to do.

I am deeply interested in the conservation of fodder for cattle, and am certain that our exports of dairy produce will not be even and regular until we have adopted a means of coping with the dry periods which we constantly experience.

I also strongly advocate the dehorning of milch cows, when carefully and expeditiously performed, and feel sure the cows suffer less from the operation than they do from contact with other horned cattle; they also become more docile, less nervous, and better servants. They would also rug better during winter months where housing is not practised.

Referring to agricultural implements of latest design, I know no better method of bringing them under the direct notice of farmers than by permitting the agents to have such implements publicly tested at the colleges and State farms throughout the colony.

SPLIT PEAS.

Among the many additional crops which might be produced by our Southern farmers, peas as a field crop might be mentioned, and it is somewhat surprising that they have not received attention, particularly as the import of what is commonly known by the name of "split peas" is considerable.

There is no need to go minutely into the cultivation of this food product, as all tillers of the ground have at one or other time of their lives grown this plant. There is, however, this much to be said of the crop: That it requires very little labour to prepare the product for the market, merely harvesting, threshing, and winnowing. For split peas, choose those which produce small pods and seeds, divide into halves easily, and of which the skin of the pea is loose. It will be found that, in threshing such kinds, the seeds split into halves; and that, in winnowing, the skins are blown off, leaving the article ready for the market.

It might also be mentioned that dried and tinned peas are also largely imported. Why should not our farmers and manufacturers stop this importation by producing and preparing this article within the colony?

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE—
NOVEMBER.

Farm.—The cutting and storing of farm produce, including oats, barley, wheat, wheaten and lucerne hay, kept students, men, and teams busy during the first week. A heavy fall of rain, 3.34 inches, put a check on the work for a few days, but gave the grass a chance to come on and put an end to the grievous drought which had for some weeks prevailed throughout the district. During the third week, the stud wheats were harvested. They all appear to have done well, 75 per cent. of them being free from rust. Summer planting of corn was begun during the last week of the month. Ten acres of the old potato land was, after thorough cultivation, planted with this crop. Sixteen acres of panicum were sown also on the old potato land. A summer crop of potatoes, $1\frac{1}{2}$ tons per acre on 5 acres, gave a good return under existing conditions—the ravages of the potato fly and worm detracted greatly from the quality of the tuber.

Dairy.—The average number of cows milked during the month was fifty-nine. One thousand seven hundred and eighty nine gallons of milk were put through the factory, 832 gallons of which yielded 854 lb. of cheese, and 957 gave a return of 378 lb. of butter. The dairy cattle were allowed to graze on the creek paddock during the day, and at night on the home paddock. The cows were taken on to the imported grasses and lucerne for about an hour each day.

Piggery.—The natural increase among the pigs was as follows:—Berks-Grade, 5; Tamworths, 7; Yorks., Large, 5; Yorks., Mid.-Berks., 3; 3 Berkshire boars and 2 Berkshire sows were disposed of.

Purchases.—Twenty-nine stores were procured for feeding on Swedes and waste from the farm, garden, and dairy. The pure-breds advertised in the *Journal* are in good demand, and several orders for them have been filled.

The Mechanical Department.—Besides the usual repairs, some five new desks have been built for the class-rooms. The poultry-yards are now nearing completion, and a description of them will be reserved for a future issue of the *Journal*.

Orchard.—The new orchard on the hill is in good order, and the trees are in fine condition. In the creek orchard seasonable work was done, and blight kept down. The newly planted trees are doing well; the oranges especially are responding to good treatment in the shape of superphosphate and bone-dust. A great difference is noticeable between the appearance of two trees not treated and the rest. As the result of a somewhat heavier treatment, eight trees are showing magnificent foliage and fruit. In the old vineyard the vines (excepting an odd one infected with Black Spot) look remarkably healthy, and are bearing a great crop of fruit. Sulphuric acid, 1 to 50 of water, showed the best result as a fungicide. Vegetables, such as marrows, melons, cucumbers, tomatoes, and sweet potatoes were planted out. The orchard is remarkably free from weeds. The peaches have a great show of fruit.

EXTRACTS FROM THE MONTHLY PROGRESS REPORT FOR
NOVEMBER OF THE BIGGENDEN EXPERIMENT FARM.

During the first week of November, I have, in compliance with instructions received, visited a large part of the Gin Gin and Currajong districts. This was done with a view to ascertain whether any measures could be taken to alleviate in some way the serious damage the sugar-cane is there subjected to, on account of a few sharp frosts occurring there nearly every winter.

The country, which comprises some very fine forest and scrub lands, is mostly of an undulating nature. In many instances there are very rich flats, nearly completely surrounded by hills and dense forests, in consequence of which on a cold morning the air is practically quite calm. That circumstance

easily accounts for the relative severity of the frosts; but it is also favourable for trying there the preventive effects of artificially produced clouds of smoke. I gave directions in consequence, and the results next winter will be watched with considerable interest in those parts of Queensland which are more or less subject to the effects of frost. The Currajong Progress and Farmers' Association deserves to be commended for its initiative in trying to devise means to combat one of the worst enemies of their crops; and I beg to tender here my best thanks to them, and especially to their president and secretary (Messrs. Limpus and Howard), for their kind hospitality and untiring efforts to show me round the country and facilitate my work in every respect.

During my absence the farm has been well taken care of by my assistant, Mr. J. Kimber, and on my return I found everything in perfect order.

The weather, I am sorry to say, continues to be extremely dry.

The rainfall amounted to only 1.65 inches, which fell in four days at the beginning of the month. Grass and water are getting scarce in many parts of the district, and, in many instances, the potato and corn are failures. On the farm itself we had a fair crop of medium-sized tubers, and the corn is fairly high and green as yet; but rain is badly wanted to fill in the grain. Towards the south of Biggenden a few timely showers have done a great deal of good, and some very fine crops will be soon ready for picking there.

Cow peas maintain their reputation as a drought-resisting crop, and keep young and green in spite of the adverse weather.

All our available land is either under crop or ready for planting as soon as the weather will permit.

In the orchard, the trees continue to make a fair growth, and the land is clean and well tilled.

As soon as we got the material, the vines were staked and tied up. Mr. Rainford has again this month attended personally to the summer pruning.

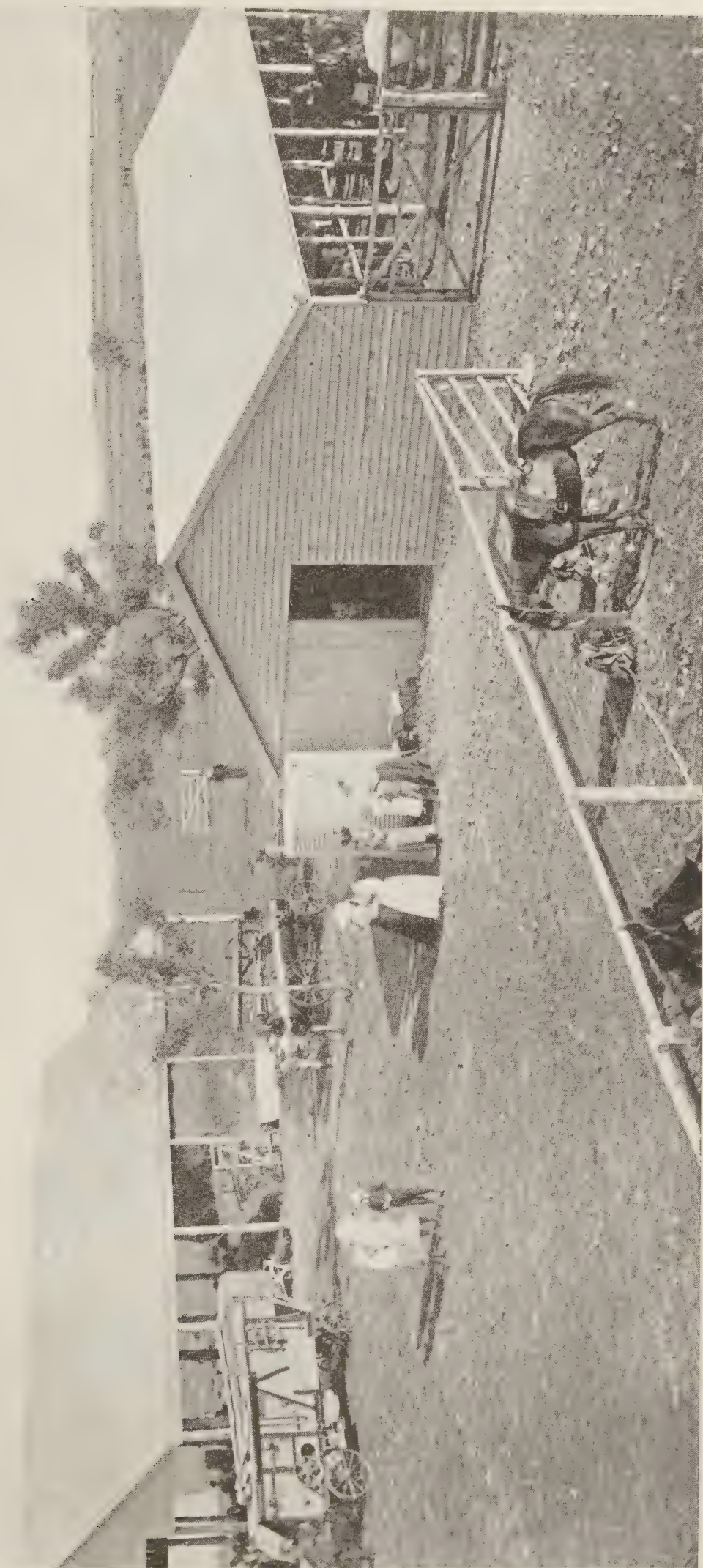
The pump in the well has given us some trouble. In order to save expense we have erected some home-made contrivances, which allow us to lift the pump and repair it without having to call in any outside skilled labour.

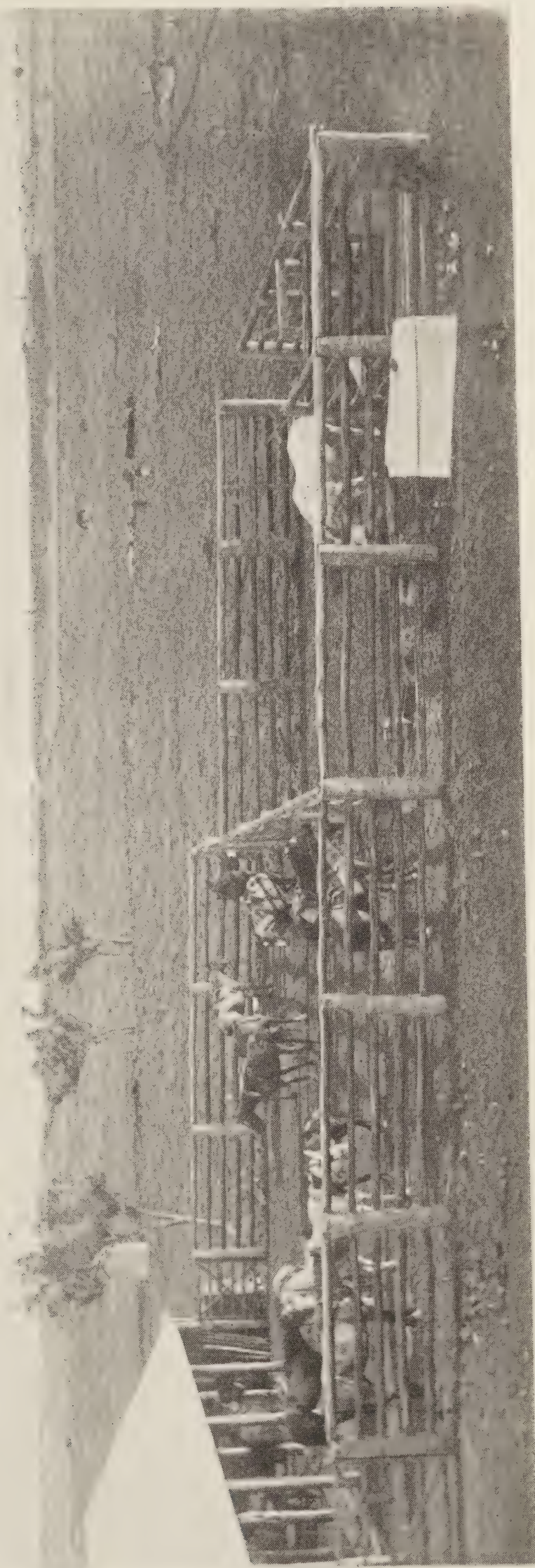
GINDIE STATE FARM.

Amongst the State farms established in various districts of the State, Gindie, under the management of Mr. Robert Jarrott, is taking its share in demonstrating the agricultural capabilities of the district in which it is situated—Springsure, on the Emerald and Springsure branch railway line. It originally formed part of the resumed half of Fernlees Station, and is watered by the Nogoia River, Mosquito, Gindie, and other creeks and lagoons. It consists mainly of open downs country, with volcanic black soil, and comprises 8,611 acres. A neat house for the manager, with other usual farm buildings, have been erected on the southern portion of the farm, where also wells have been sunk for the purpose of supplying the home farm with water. Over 100 acres were planted during 1899-1900 with different varieties of wheat. Maize, oats, barley, cow peas, and vegetables are successfully cultivated, and there is a good orchard and vineyard which both promise well in the future.

ENCOURAGEMENT TO AGRICULTURE.

According to statistics carefully computed by Professor Anderegg, of the Bern University, the Federal Government of Switzerland has spent during the last twenty years over 64,000,000 francs (£2,560,000) for the development of agriculture. The main items are agricultural education and experiments; improvement of breeds; improvement of the soil; renovation of vineyards destroyed by phylloxera; insurances against damage from hail, frost, cattle diseases, &c.





GINDIE STATE FARM.

The above handsome sum does not include the large expenses incurred for the same object by the cantonal governments, and by the communes or municipalities. Neither does it include many expenses which benefit agriculture indirectly, such as the establishment and maintenance of roads, the compiling of useful statistics, the close control exercised over private insurance companies, over the sales of manure and fertilisers, the protection of inventions, the acquisition by the Government of cavalry and artillery horses, the moneys paid to agriculturists for crops injured during encampments and military manœuvres, the extension of agricultural teaching at the Federal Polytechnum of Zürich, the protection accorded to birds useful to agriculture, &c.

SHOOTING AT THE CLOUDS AS A PREVENTION AGAINST HAIL.

By HENRY A. TARDENT.

Since I last wrote on the subject, giving a *résumé* of the work done at the International Conference of Casale Monferrata, in Italy, the movement has made rapid progress all over the south of Europe, where hail causes every year such stupendous ravages amongst the vineyards, orchards, and other crops.

Not only is the movement extending rapidly throughout Austria and Italy, where it originated, but now both Governments and private landowners are going in for it in Switzerland, South Germany, France, and even in the more slow countries of Spain and Portugal.

Here, in Australia, the question has not passed unnoticed—at least, if I judge of it by the many letters I have received from various parts on the subject.

I understand that at Mackay a group of pushing enthusiasts intend to try cloud-shooting, not only as a prevention against hail, but also as a means of causing the precipitation in the shape of rain of any moisture carried by the overhanging clouds. Those experiments will be followed with close attention throughout Australia.

In the presence of such extensive experiments, I do not know whether I am justified in making known the limited experience I had here, on the Biggenden Station Farm, on the 7th of November last.

I am well aware that no conclusion should be drawn from only one or two facts; but if we could collect, say, 100 or 1,000 similar facts, and out of them 80 or 90 per cent. should prove successful, then we would be justified in drawing favourable conclusions, and in inferring that we have made a step forward in subduing another of the destructive forces of Nature.

At all events, the facts are as stated below, and I give them for what they are worth.

On the 7th November, at 5 p.m., an ominous storm was approaching from the south-east. The sky soon became entirely overcast, with dark nimbus trailing low and moving rapidly from south-east towards north-west.

At 5.15 hail began to fall heavily, intermixed with a few drops of rain. For want of any heavier weapon, I took an ordinary breechloader, and fired four shots straight upwards at about half-minute intervals. In less than *two* minutes the hail ceased altogether, and was replaced by an abundant shower of very heavy drops.

At 5.30 the storm moved gradually towards the north-west, where the rain was much heavier without any sign of hail.

Here the total precipitation amounted to only 0.14 inches.

A subsequent inquiry revealed the fact that both south and north of the farm the hail had been considerably heavier without any rain whatever.

A young and very clever gentleman, Mr. C. S. McGhie, solicitor, in Maryborough, was just visiting the farm at the time, and happened to be present at the experiment.

He at first thought I was having some fun when he saw me aiming and shooting at the clouds.

I told him that if he would look at his watch he would, in two minutes, see rain taking the place of the now-falling hail.

His face expressed the profoundest stupefaction and admiration when he saw the event justify my forecast within the prescribed time, he holding, during the experiment, his watch in his hand.

For the theory of the phenomenon and the *modus operandi*, I beg to refer the reader to my article on "Hail and Hailstorms," in Vol. VI., p. 251, of the *Journal*. On page 46 of this issue are shown the shapes of the weapons now mostly used for cloud-shooting. So far the best results seem to have been obtained from short mortars, the mouth of which abuts to an inverted metallic funnel, which directs the sound waves straight upwards instead of allowing them to spread horizontally.

Considering the great damage done every year by hailstorms in certain districts, I think it would be worth while for those interested to inquire about the price of those mortars, which cannot be very high, and to give them a trial.

The thing should not be done in a haphazard and half-hearted manner, which ends in failure in any enterprise. It should be taken in hand co-operatively by a group of farmers capable of some enthusiasm and resolved to save their crops if they can. They should make themselves acquainted with the thousands of experiments carried on in other countries, with the laws that govern storms in general, and more especially hailstorms. They would then be enabled to adapt both to the local circumstances they are placed in, and to modify their arrangements in accordance with the teaching to be derived from every experiment.

There are in the colony certain districts and places more exposed than others to the devastation of hailstorms.

Those should be selected for the first experiments, especially if farming is there carried on to any extent. I have in view some places near the Range, in the Toowoomba and Warwick districts, as likely to be suitable for the purpose.

The same may be said of a stretch of country in the Roma district extending from south-west to north-east, in a line starting, say from Mount Abundance Station, along the Bungeworgorai farms and the northern road, and further up in the direction of Guberramunda. The line passes over some of the finest and best-kept vineyards to be found in Australia. They are certainly worth preserving—if possible—from hail, which is not infrequent there. From personal observations during many years' residence in that district, I am inclined to think that a few shooting stations, spread at proper intervals on the above-described line, would be sufficient to at least considerably attenuate the losses experienced nearly every year by the vinegrowers of that district.

Should the experiments prove successful, a second line of defence, destined to protect the town itself and surrounding vineyards, could start at the Ormonds, then along Thelswell Ridge, and across the town on the Bottletrees Recreation Reserve, and thence further over the Sleepy Creek farms towards the so-called Mount Bassett.

[A remarkable phenomenon was observed by a gentleman in Switzerland who, in the course of a tour, had climbed to a height whence he could look down upon a gathering storm many feet below him. The battery in the valley below commenced firing at the clouds, and the observer above them noticed that at each discharge the heavy cloud rose in the form of a dome and broke up, the force of the air waves set up by the explosion below bulging the hail cloud upwards, finally bursting it, like an over-inflated bag.—Ed. *Q.A.J.*]

Dairying.

FEEDING BACON PIGS.

Some time ago we (*Pastoralists' Review*) called attention to pig-fattening as a profitable means of disposing of cheap wheat, and we now notice that Mr. R. Campbell, of Millicent, in the south-east of South Australia, has furnished some particulars of his experience, warning, however, those who want to succeed at the game that, when the pigs are first put into the fattening pens sufficient mush should be given to about gorge them, and then the trough filled up with dry grain, and never allowed to become empty. If only sufficient grain for a feed is given from time to time the pigs will bolt it, and the result will be waste. A trough filled with clean water should be provided, as well as that with grain. Mr. Campbell bought thirty pigs, from suckers to well-grown stores, in the middle of February, and sold them before 7th September without undue forcing. Against one test pen an account was kept of food eaten, which is as follows:—On 1st August, eleven pigs, valued at £1 5s. each, up to 4th September disposed of eleven bags of wheat valued at 9s. per bag. Cost of pigs, £13 15s.; value of wheat, £4 19s.; total, £18 14s.; the pigs were sold alive in Adelaide, and netted £26 7s. 11d., or about £2 4s. 9d. each. Nine of these were half-bred Tamworths, and the other two nearly pure-bred Berkshire, with a Tamworth cross.

The *New Zealand Farmer* also gives the following:—

In connection with this subject, it is also worth while to quote the following from a paper read before the Port Germain (S.A.) Bureau of Agriculture by Mr. E. G. Blessing:—"My practice is to boil all the feed when fattening pigs, as I find it more economical, and they like it better. A change of feed is beneficial also. Barley I find produces the firmest bacon, but pigs do not fatten so quickly on it as on wheat. One important point is to keep the sties warm and dry, and not to overcrowd them. Three or four pigs are enough for one sty. For about six months in the year I feed my pigs on skim-milk and greenstuff only. As to the best breed of pigs, the vital question is—Which pig will produce the most bacon with the least amount of feed? There are four distinct breeds, viz.:—The Berkshire, Essex, Poland-China, and White Yorkshire.

Undoubtedly the Berkshire pig gives a maximum of lean meat with a minimum of fat, which is a consideration with most people, whereas the Essex gives a larger amount of fat in proportion to the lean; yet where lard is the object an Essex will yield as much as two Berkshires and of a superior quality. I find I can fatten three Essex pigs with the same quantity of feed that it takes to fatten two Berkshires, and there will be very little difference in the weight of each pig. In addition, the Berkshire pig invariably takes to eating poultry, even when well fed, which the Essex rarely do. Having tried the four breeds mentioned, I have come to the conclusion that the best pig is a cross from an Essex boar mated with a Berkshire sow. The pure Essex sows are very unprofitable for breeding; in fact, some will not breed at all, others only one litter of six or seven a year, whereas most Berkshire sows will have two litters a year of eight to ten each litter. These, at 7s. each, when six weeks old, will yield a handsome profit on the feed. It does not pay to keep pigs over twelve months old, except for breeding or show purposes, as the most saleable bacon is is that from pigs under 150 lb. weight.

Among grains mentioned in the report as serviceable in the final development of bacon hogs the first place is given to barley, whether fed alone or in combination with other grains, such as peas, wheat, oats, maize, and shorts. Reference is also made to the value of shorts and middlings as a food for both

young and older pigs. Peas, on account of the large amount of protein they contain, are stated to make an admirable adjunct to other grains in the feeding of swine, especially when fed ground, although they have given good results where they have been fed whole, after having been previously soaked for some hours. The great value of dairy by-products as part of the rations for fattening swine has been proved by numerous experiments in the Dominion. The report states that there is practically no difference in the feeding value of skim-milk, butter-milk, or whey, when all three are fed in prime condition. Mention is also made of the use of molasses, potatoes, roots, bonemeal, and wood ashes. With regard to molasses, it is stated that, according to an experiment conducted in Germany, this food can with advantage be mixed with barley in equal proportions, or in the proportion of 2 parts of barley to 1 of molasses. The use of small quantities of bonemeal and of hardwood ashes has been found to produce very beneficial results in the case of pigs fed on maize-meal, the quantities used per week being about three-fifths of 1 lb. of bonemeal or about 2 lb. of ashes. Cooked potatoes, mangolds, and carrots are also said to be profitably used with grain without any injurious effects on the bacon.

STERILISING MILK AND BUTTER.

M. Rocques reported on the results which Kühn has obtained in the "sterilisation of milk" in large bulks by the combined action of pressure and heat. His apparatus is known as a "girator." The sterilisation is effected at 110 degrees Cent., and the pressure, produced by the dilatation of the liquid and the generation of gas and vapour, attains 6 kilogrammes per square centimetre (85 lb. per square inch).

M. Bertrand described a new "Butyrometer," the invention of Mercier, in which the butter, separated from the milk by a mixture of sulphuric acid and amyl alcohol, is determined volumetrically in a graduated tube, fixed in a centrifugal apparatus worked by a spring.—*Engineering*.

DRIVING DOWN BUTTER PRICES.

The *Mark Lane Express* says there is a very strong "bear" movement just now among agents selling Australian and New Zealand butter. This occurs at the beginning of every season; only this year it is stronger than usual. Whether this movement originates with those agents who are dealers as well as commission agents it is difficult to decide, but that it is carefully nurtured by both Australian and English agents who are dealers is beyond any doubt, as it plays distinctly into their hands. The object of these agents is to drive prices down at the beginning of the season so that they can buy the output of Australasian factories at a low figure, and thus secure large profits for themselves.

HOW TO PREVENT MOTTLES IN BUTTER.

As the uneven distribution of the salt in the butter is the cause of mottles, then obviously the way to prevent the trouble is to get the salt thoroughly worked in. But in doing this butter-makers have experienced considerable difficulty, which is often more imaginary than real. Many butter-makers who understand the cause of mottles still have difficulty because they are afraid of over-working. That there is danger in over-working in some cases has been verified too many times to admit of dispute. But it is doubtful if there are many instances where the butter would need to be over-worked to thoroughly incorporate the salt. The tendency is to under-work instead of to over-work butter. Butter-makers desire a coarse grain, whereas a fine grain which would come with more working would be more acceptable.

Working the butter is the only way to insure its being evenly coloured, and how to work it sufficiently in all cases and not injure the grain is the question. It is often advised to give the butter two workings, working it only sufficiently the first time to incorporate the salt so that it will be dissolved. The second time the butter is put on the worker after it has stood in the refrigerator for 24 hours it can be worked without as much injury to the grain as when it was fresh. This is the claim made by advocates of this system.

To test the result of working butter under different conditions, all the butter from one churning was washed with water at 50 degrees and was given the required amount of working from 20 to 24 revolutions of the worker to insure the salt being so thoroughly distributed that the butter would be evenly coloured. The next churning was washed with water from 38 to 40 degrees, and worked from 21 to 24 revolutions of the worker. The third churning was washed with water at 45 degrees, worked 10 revolutions of the worker, and set in the refrigerator at 50 degrees for 24 hours, when it was worked from 11 to 14 revolutions in addition to the 10 revolutions of the first working. The fourth churning was taken immediately after washing, and was set in the refrigerator without working, where it was allowed to remain for 24 hours. At the end of this time it was worked from 21 to 24 revolutions of the worker. This series was repeated five times, in all being twenty churnings. Samples of this butter were submitted to Major Henry E. Alvord, Chief of the Dairy Division of the Department of Agriculture, who kindly agreed to score the grain. It was found on inspection that the samples from the lots washed with water at 40 degrees and below and worked 21 revolutions were slightly mottled, though Mr. Alvord gave the assurance that they were not sufficiently so to lessen the market value. The same butter worked 24 revolutions of the worker was coloured perfectly.

As nothing but the grain of the butter was to be scored, a basis of 100 per cent. for perfect was used instead of the smaller basis given in ordinary scoring when all qualities are to be taken into consideration. It would be very easy, however, to calculate the score given on the basis in common use.

The scores on three of the series are given in the following table:—

TABLE III.

Sample.	Temperature of Water.	Revolutions of Worker, 1st Working.	Revolutions of Worker, 2nd Working.	Score.
1	50	21	...	98
2	50	24	...	100
3	40	21	...	100
4	40	24	...	99
5	45	10	11	98
6	45	10	14	99
7	45	...	21	98
8	45	...	24	96
9	50	21	...	99
10	50	24	...	98
11	38	21	...	100
12	38	24	...	100
13	45	10	11	98
14	45	10	14	98
15	45	...	21	97
16	45	...	24	95
17	50	21	...	98
18	50	24	...	99
19	40	21	...	100
20	40	24	...	99
21	45	10	11	98
22	45	10	14	97
23	45	...	21	96
24	45	...	24	95

In Table III. Samples Nos. 1 and 2 came from the same churning as did 3 and 4 from the second churning and so on through the table, two samples coming from each churning. Only three series are given, as the other two series were practically the same as the ones given, and would not change the general result.

A study of the table will show that the butter washed with water at 40 degrees and under, and worked 21 and 24 revolutions of the worker immediately after being taken from the churn, has a slight advantage in regard to the average grain, while the butter set in the refrigerator for 24 hours without any working whatever has considerably the lowest average grain. There is practically no difference in the average grain of the lots washed with water at 50 degrees, and given all the working immediately after being taken from the churn, and the lots washed with water at 45 degrees and set in the refrigerator for 24 hours after being partially worked. It will be remembered that this last method of partially working the butter and allowing it to harden in the refrigerator before the final working is the one usually advised by the best butter-makers to be followed in cases where there is serious trouble with mottles.

Mr. Alvord, in his notes given along with the score of this butter, said that it was very doubtful if, except in a few cases of the lowest score, any of the butter would have been given other than a perfect score on grain in a contest such as is held by State dairy associations. The objection of Mr. Alvord to the butter scored the lowest, and which the table shows were the lots which had been set in the refrigerator previous to receiving any working whatever, was that it was very dry and sticky. This was noticed in working the butter. So much so that considerable difficulty was experienced by the butter adhering to the worker. This was the case with all the lots set in the refrigerator before working, and it will be noticed from the table that the longer the butter was worked the more pronounced was this objectionable feature. The butter which handled the nicest on the worker, which scored the highest, and which seemed to impress Mr. Alvord more favourably than any of the other because, as he said, of the fineness and compactness of the grain, was that which came from the lots which were washed with water at 40 degrees and below. The only point that could be urged against this method is that it requires slightly more working to insure evenness of colouring, and is a little harder to handle with the ladle while working. During the hot weather of summer it would certainly be much preferable, as the working can be finished before the butter has become so soft through contact with the warm air as to render working difficult if not impossible.

EFFECT OF ICE-WATER ON SOLIDITY OF BUTTER.

There has been an objection urged by many butter-makers against the use of cold wash-water, or the use of extreme cold in any way connected with butter-making. It is claimed that where ice-water is used to wash the butter, or that where ice is added to the cream during churning, the butter so treated will not "stand up" so well comparatively under the effect of a warm temperature. In other words, it would become softer or would become soft quicker when exposed to summer heat. This would certainly be a very serious objection if it were so.

Though any work along the line of testing the effects of ice and ice-water on the consistency of butter was outside of the work undertaken and which this bulletin is supposed to cover, it was deemed best to experiment along this line before advising the use of such cold water in washing butter.

To test the effect of ice-water on the butter, each of ten churnings was divided into two lots immediately after the butter-milk had been drawn. One lot from each churning was washed with water at the churning temperature, from 50 to 52 degrees. The other lot was washed with water at from 35 to 40 degrees. One sample of butter from each lot was placed at a temperature of 70 degrees, and another sample from each lot was placed at a temperature of

48 degrees. After standing for a day, all samples were placed at a temperature of 60 degrees and allowed to stand for four hours, so that all samples would be the same temperature throughout. At the end of the four hours the temperature was gradually increased to 80 degrees. The samples were watched during this time to see which became soft the quicker, and which was the softest at the end of the time. As there has been no mechanical method for determining exactly the comparative solidity of different lots of butter, we were forced to rely solely on the sight and touch. This is not exact, of course, but as far as all practical purposes are concerned there would be no difference in the market value of two lots of butter, other things being equal, where the difference in firmness could not be easily distinguished by pressure or cutting. In the work at this station all lots of butter were found to be practically the same in consistency. Sometimes the lot washed with the colder water and set in the refrigerator would be found to be a little harder than the other, and *vice versa*. In no case was the difference sufficiently marked to be used as a basis for any conclusions or even suspect that one method was superior to the other. It was noticed, however, that samples of the butter, whether washed with the water at 50 degrees or 35 degrees, if put in the refrigerator, retained its firmness when exposed to summer heat a little better than that which had been kept at a warmer temperature, though, after all lots had been held at 80 degrees for two hours, no difference in consistency could be distinguished. Whether this firmness of the samples which had been kept in the refrigerator was due to the treatment at the time of churning and washing, or because insufficient time was allowed for all the butter to get to 60 degrees while it was being held at this temperature, is questionable.

As was stated at the beginning of this bulletin, one of the most frequent questions asked at this station was concerning the cause of unevenly coloured butter. The great majority of questioners are dairy farmers who own a few cows and make their own butter. The great need on the small dairy farm is better facilities, more tools to work with. It is because of the lack of what are almost necessities for handling the product that so much difficulty is experienced in making butter that commands the best market price. The principal reason why the small dairyman has so much unevenly coloured butter is because he has no tools with which the butter can be properly worked. The old-fashioned butter bowl and ladle are still in universal use on the smaller dairy farm. Where but 3 or 4 lb. of butter are made at one time for the family use, the butter bowl may be sufficient, but where more than this is made and made to sell it is impracticable, if not impossible, to work the salt in evenly without some more advanced way of handling the product. A number of small inexpensive machines for working butter are sold by different firms who handle dairy apparatus. Any one of these is superior to the hollow bowl and spoon-shaped ladle.

CONCLUSIONS.

1. The uneven distribution of salt is the cause of unevenly coloured butter, spoken of as mottled butter.

2. Washing the butter with water below 40 degrees does not cause mottles. It does, however, make a little more working necessary to thoroughly distribute the salt.

3. The light-coloured streaks or portions of mottled butter are not caused by an excess of casein, but mottles is evidently caused by some physical action of salt on the butter fat which causes it to admit more light.

4. Mottles can be prevented by working the butter sufficiently to thoroughly distribute the salt.

5. Butter washed with water at 40 degrees and under, and worked immediately shows a better grain when sufficiently worked to ensure its being evenly coloured than with any other treatment.

6. Washing butter with water at 40 degrees and under does not injure its firmness when subjected to high temperature.—*Maryland Agricultural Experiment Station.*

DAIRY HERD.
QUEENSLAND AGRICULTURAL COLLEGE.
RETURNS FROM 1ST TO 30TH NOVEMBER, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Com- mercial Butter.	Remarks.
			Lb.			
Blink ...	Ayrshire ...	21 Mar., 1900	195	3·9	8·51	Dry, 26-11-00
Linnet ...	" ...	15 May "	660	3·7	27·35	
Lavina ...	" ...	6 April "	645	3·6	26·0	
Rosebud ...	" ...	10 April "	782	3·8	33·28	
Annie Laurie*	" ...	30 May "	865	3·8	36·81	
Ream ...	" ...	24 July "	741	3·7	30·7	
Isabelle ...	" ...	7 July "	714	3·8	30·38	
Lena ...	" ...	13 July "	722	3·6	29·11	
Leesome*	" ...	1 Sept. "	812	3·7	33·64	
Ream Routhie	" ...	20 Sept. "	715	3·7	29·62	
Ruth ...	" ...	8 Oct. "	611	3·6	24·63	With first calf
Annie ...	" ...	8 Oct. "	623	3·5	24·42	With first calf
Laura ...	" ...	28 Aug. "	585	3·8	24·89	With first calf
Jersey Belle	Jersey ...	21 May "	413	5·5	25·44	With first calf With first calf
Content*	" ...	18 July "	614	4·6	31·63	
Playful*	" ...	14 July "	725	4·1	33·28	
Baroness ...	" ...	3 Aug. "	611	4·3	29·42	
Carrie ...	" ...	18 Aug. "	435	4·0	19·48	
Spec ...	" ...	26 Aug. "	417	4·1	19·16	
Stumpy*	" ...	29 Aug. "	752	4·2	35·37	
Eveleen ...	" ...	2 Sept. "	633	5·3	37·08	
Beatrice ...	" ...	3 Sept. "	554	4·2	26·06	
Connie ...	" ...	8 Sept. "	647	4·5	32·66	
Ivy ...	" ...	28 Aug. "	614	4·3	29·57	With first calf With first calf
Bashful ...	" ...	2 Nov. "	462	4·4	22·76	
Russet ...	Grade Shorthorn	7 Oct. "	716	3·6	28·86	
Alice ...	" "	13 Nov. "	190	3·8	8·08	
Eva ...	" "	18 May "	547	3·9	23·89	
Polly ...	" "	29 Jan. "	323	3·7	13·38	
Stranger ...	" "	7 July "	722	3·8	30·72	
Ball ...	" "	14 Aug. "	355	3·4	13·51	
Duchess ...	" "	24 Aug. "	698	3·5	27·36	
Restless ...	" "	3 Sept. "	717	3·7	29·71	
Rosella ...	" "	5 Sept. "	783	3·8	33·32	Dried off, 20-11-00
Lucy ...	" "	27 Sept. "	851	3·6	34·31	
Leopard ...	" "	29 Sept. "	695	3·9	27·10	
Redmond ...	" "	12 Sept. "	774	3·8	32·94	
Pet ...	Grade Jersey	14 Aug. "	487	3·7	20·18	
Fancy ...	South Coast	21 May "	488	4·2	22·95	
Dairymaid	Holstein	15 May "	583	3·8	24·81	
Violet ...	Shorthorn	9 Oct. "	725	3·6	29·23	
Cherry ...	" ...	19 Feb. "	110	3·5	4·31	
Gladly ...	" ...	2 May "	583	3·5	22·85	
Hilda ...	" ...	25 May "	326	3·8	13·87	Dried off, 20-11-00
Louisa ...	" ...	6 April "	658	3·7	26·26	
May ...	" ...	20 May "	514	3·6	20·72	
Nestor ...	" ...	21 April "	452	3·9	19·64	
Spot ...	" ...	11 Sept. "	688	3·8	29·28	
Kit ...	" ...	28 Sept. "	718	3·7	29·75	
Brush ...	" ...	28 Sept. "	651	4·0	29·16	
Plover ...	" ...	3 July "	784	3·8	33·36	
Guinea ...	" ...	20 Feb. "	523	4·1	24·01	
Queenie ...	" ...	29 April "	657	3·7	27·22	
Frizzy ...	" ...	23 Aug. "	673	3·9	29·28	Dried off, 20-11-00
Maggie ...	" ...	20 June "	471	3·5	18·46	
Laurel ...	Grade Shorthorn	10 Sept. "	777	3·8	33·06	
Empress ...	" "	20 Nov. "	172	3·8	7·32	
Curly ...	" "	10 Dec., 1899	544	3·9	23·76	
Trial ...	" "	31 Oct., 1900	790	3·9	34·5	

The dairy herd grazed chiefly on natural pasture. On some occasions they were allowed one hour grazing on artificial grasses or lucerne plot.

Cows marked * were fed for experiment purposes, particulars of which appear herewith.

DAILY YIELD OF FIVE COWS FED ON ORDINARY PASTURE FOR TEN DAYS.

Name of Cow.	1ST DAY.			2ND DAY.			3RD DAY.			4TH DAY.			5TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie (A.)...	28	3·8	1·19	27	3·7	1·11	28	3·8	1·19	28	3·9	1·22	28	3·8	1·19
Leesome (A.) ...	31	3·6	1·24	31	3·8	1·31	31	3·7	1·28	31	3·6	1·24	30	3·9	1·31
Playful (J.)...	23	4·6	1·18	23	4·2	1·08	24	4·2	1·108	24	4·4	1·18	25	4·1	1·23
Stumpy (J.) ...	26	4·0	1·16	25	4·3	1·20	26	4·4	1·28	27	4·1	1·23	27	4·3	1·3
Content (J.) ...	19	4·5	·95	18	4·4	·88	20	4·3	·96	20	4·4	·98	19	4·6	·97

Name of Cow.	6TH DAY.			7TH DAY.			8TH DAY.			9TH DAY.			10TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie ...	27	3·7	1·11	27	3·9	1·17	28	3·9	1·22	28	3·7	1·16	29	3·8	1·23
Leesome ...	31	3·9	1·35	30	3·9	1·31	31	3·7	1·28	31	3·8	1·31	32	3·7	1·32
Playful ...	24	4·5	1·20	23	4·5	1·15	24	4·4	1·18	24	4·3	1·15	25	4·2	1·17
Stumpy ...	26	4·2	1·22	27	4·2	1·26	27	4·1	1·23	27	4·3	1·30	26	4·4	1·28
Content ...	20	4·5	1·00	20	4·4	·98	19	4·5	·95	18	4·5	·90	20	4·4	·98

DAILY YIELD OF FIVE COWS FED ON A RATION OF MIXED CHAFF AND MOLASSES FOR TEN DAYS.

Name of Cow.	1ST DAY.			2ND DAY.			3RD DAY.			4TH DAY.			5TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie ...	27	3·9	1·17	28	3·7	1·16	28	3·8	1·19	27	3·9	1·17	29	3·7	1·20
Leesome ...	30	3·9	1·31	31	3·9	1·35	30	3·9	1·31	30	3·9	1·31	32	3·7	1·32
Playful ...	23	4·5	1·15	24	4·4	1·18	25	4·0	1·12	25	4·3	1·20	25	4·2	1·17
Stumpy ...	27	4·3	1·30	27	4·1	1·23	27	4·3	1·30	28	4·4	1·37	28	4·5	1·41
Content ...	20	4·4	·98	24	4·4	1·08	23	4·5	1·15	22	4·3	1·05	21	4·4	1·03

Name of Cow.	6TH DAY.			7TH DAY.			8TH DAY.			9TH DAY.			10TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie ...	29	3·9	1·26	29	3·5	1·13	30	3·9	1·31	29	3·7	1·20	30	3·8	1·27
Leesome ...	31	3·9	1·35	30	3·9	1·31	33	3·6	1·32	31	3·7	1·40	33	3·9	1·44
Playful ...	24	4·5	1·20	24	4·2	1·12	25	4·3	1·20	26	4·2	1·22	25	4·4	1·23
Stumpy ...	29	4·2	1·36	28	4·3	1·34	28	4·1	1·28	27	4·3	1·29	28	4·4	1·37
Content ...	23	4·5	1·15	23	4·6	1·18	22	4·5	1·10	22	4·5	1·10	23	4·5	1·15

DAILY YIELD OF FIVE COWS FED ON RATION OF MIXED CHAFF AND OILCAKE (SUNLIGHT).

Name of Cow.	1ST DAY.			2ND DAY.			3RD DAY.			4TH DAY.			5TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie ...	29	4·0	1·29	29	3·9	1·26	30	4·0	1·34	30	3·9	1·31	31	3·9	1·35
Leesome ...	33	3·6	1·33	34	3·8	1·44	34	3·6	1·36	32	3·7	1·32	33	3·6	1·32
Playful ...	26	4·1	1·19	25	4·3	1·20	27	4·3	1·3	26	4·4	1·28	26	4·2	1·22
Stumpy ...	29	4·2	1·36	29	4·4	1·41	30	4·3	1·44	31	4·4	1·52	31	4·2	1·45
Content ...	22	4·4	1·08	23	4·4	1·13	23	4·3	1·10	23	4·2	1·08	22	4·4	1·08

DAILY YIELD OF FIVE COWS FED ON RATION OF MIXED CHAFF AND OILCAKE (SUNLIGHT)
—continued.

Name of Cow.	6TH DAY.			7TH DAY.			8TH DAY.			9TH DAY.			10TH DAY.		
	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.	Milk.	Test.	Butter.
	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.		lb.
Annie Laurie ...	32	3·9	1·39	31	3·8	1·31	30	3·8	1·27	30	3·8	1·27	29	3·7	1·20
Leesome ...	34	3·6	1·37	33	3·6	1·33	33	3·6	1·32	34	3·7	1·40	32	3·8	1·35
Playful ...	25	4·4	1·23	26	4·2	1·22	27	4·3	1·29	28	4·4	1·37	27	4·4	1·33
Stumpy ...	31	4·3	1·48	30	4·4	1·47	30	4·3	1·44	31	4·2	1·45	32	4·3	1·53
Content ...	22	4·3	1·05	22	4·5	1·10	23	4·5	1·15	23	4·3	1·10	22	4·4	1·08

TOTAL YIELDS.

Name of Cow.	1ST PERIOD OF TEN DAYS.		2ND PERIOD OF TEN DAYS.		3RD PERIOD OF TEN DAYS.	
	Milk.	Butter.	Milk.	Butter.	Milk.	Butter.
	lb.	lb.	lb.	lb.	lb.	lb.
Annie Laurie ...	278	12·41	286	12·06	301	12·99
Leesome ...	309	12·95	314	13·34	332	13·54
Playful ...	239	11·64	246	11·79	263	12·63
Stumpy ...	264	12·16	277	13·25	304	14·55
Content ...	193	9·55	221	10·97	225	10·95

FIRST PERIOD.—Cows fed on natural pasture only.

RATION FED DURING SECOND PERIOD OF TEN DAYS.

10 lb. mixed chaff.

1 quart molasses (mixed with four times its bulk of water).

This ration was fed twice a day.

RATION FED DURING THIRD PERIOD OF TEN DAYS.

Sunlight oilcake, 2 lb.

Mixed chaff, 10 lb.

Oilcake was soaked in hot water until it became quite soft, then mixed with the chaff, and fed moist. A handful of salt was added to each feed. This ration was fed twice a day.

These experiments were made with five cows from the College herd.

Annie Laurie and Leesome are Ayrshires ; Stumpy, Content, and Playful are Jerseys.

For the first period of ten days they were allowed to graze in the paddocks, no extra food being given.

For the next ten days they were fed on a ration of mixed chaff and molasses, quantities and particulars of which are given elsewhere.

For a further period of ten days they were fed on a ration of mixed chaff and oilcake, as given in ration table.

A small increase in quantity of milk produced resulted as may be seen from table published herewith, and the production of butter fat yielded was practically unchanged.

OATMEAL FOR COWS.

Mr. James Trow, of Rocklea, reports very favourably on oatmeal as a food which materially increases the amount of butter fat in milk. He was fortunate in being able to purchase cheaply a dozen casks of oatmeal, being surplus ship's stores. He mixed a portion of this with rough chaff and a little molasses, allowing each cow about 3 lb. of the oatmeal. The result of this feeding was an increase of 4 lb. of butter per week, and Mr. Trow attributes the increase to the oatmeal, which increased the butter fat in the milk. Oatmeal is expensive food, but a cheaper form of it would be oats roughly ground at the local mills.

CURING BACON.

An English method of bacon-curing is as follows: As soon as the pig is killed and properly cut up, rub the sides with fine salt, thoroughly filling every crevice. Next day scrape off all the salt not absorbed, cleanse the vessel, and salt as before. Repeat this for three days. The fourth day take $\frac{1}{4}$ -lb. of saltpetre and a handful of common salt to every 70 lb. of meat, and rub it in as before. Then mix 1 lb. of coarse brown sugar and one pint of common molasses, and pour over the saltpetre; repeat this twice a day for three days, and then once a day for a month. Smoke with sound maple, hickory, or any other sweet wood. Never, under any circumstances, use rotten wood. The smoke-house should be open, so that the smoke can easily escape. Do not smoke on wet days, and do not hurry the business—two weeks in the smoke-house is not too long. It will be seen that, to secure the much-desired excellence in bacon, considerable pains must be taken—more, in fact, than any of our hustling farmers will care to take. But when the bacon is finally ready for the table it will be as much superior to ordinary distillery slop or maize-fed stuff.

PREVENTING SOWS OVER-LYING.

Great loss is annually caused to pig-breeders by the sow over-laying her young, and a cheap and effective remedy will be welcomed. An English exchange says:—One which will be found to answer very well is to run a plank round the interior of the house about 10 inches from the floor, which prevents the sow lying close to the wall and leaves a space under which the young pigs can crawl. A 2-by-8-inch plank supported every 12 inches by a small block would answer the purpose and repay the cost many times over.

Horticulture

FERTILISING CHRYSANTHEMUMS.

A French grower has adopted a very novel method of fertilising his chrysanthemums. He collects all of the remains of his old plants, dries them, and then makes a tea or extract by boiling them in water. The tea is made use of as a liquid fertiliser. The result is stated to be very satisfactory.

The Horse.

CLINICAL NOTES.

VASECTOMY.

A. Chinniah, veterinary surgeon, writes in the *Tropical Agriculturist*, Colombo:—On the 25th of August last I performed this operation on an Arab horse, Anthony. Instead of amputating the whole cord, I removed only about 2 inches of the *vas deferens*, more by way of experiment than for any other reason. I am glad to say that the operation was attended with no bad results, but in fact was as successful as could be desired, as the animal was able to be ridden on the twelfth day after the operation.

The following was the *modus operandi*:—The animal was thrown down and secured in the usual way, but no chloroform was used. I began by making an antero-lateral section, with proper antiseptic treatment, on the off side of the scrotum along the line of the cord, and carefully dissected and took out the *vas deferens*, which was evidently severed, and a piece about 2 inches in length removed. I fastened the wound with catgut ligature and covered it with antiseptic cotton wool, and painted it over with collodion. The incision on the near side was postero-lateral, and made close to the groin. As a result there was a slight bleeding from the scrotum. This wound was treated similarly to the first. The first wound was an exposed one, and required to be protected from flies, but that on the near side did not give this trouble, though from its peculiar position it caused an awkward gait in the animal till it was perfectly healed. I, however, prefer the antero-lateral to the postero-lateral section.

The advantages of this operation over ordinary castration are: (1) It preserves the testicles, as a natural appendage of the horse. (2) It is less painful and cruel, as no nerve is burnt, cut, or twisted. (3) The healing is quick, and in this, particular care was effected in what I consider to be the minimum time. (4) There is no liability to tetanus. (5) There is less chance of the growth of a schirrous cord. (6) There is little or no bleeding. (7) There is economy in the preservation of tissues which in the ordinary operation are cut or mutilated. Perhaps the only objection that could be brought against this operation is that it is apt to cause perplexity to the breeder, and even mislead him, as the presence of the testicles is apt to deceive him into the belief that an animal so operated on is still a stallion. A new term would be required for such horses, for the term "gelding" would not correctly describe them.

CURE OF BOTS IN HORSES.

The United States Department of Agriculture publishes a simple cure for bots in horses. An experimenter tried a few tests upon a quantity of live bots taken from a horse which the bots had killed. When put into sage tea they died in fifteen hours; but, as that was too slow a process, he tried them in nitric acid; but it seemed to trouble them no more than water. He then bruised some tansy, and made an infusion of the juice, and put some of the bots into it. They were dead in a minute. As he had a horse suspected of being troubled with bots, he gave him some tansy tea in the morning, and a dose of salts in the evening. The next morning the horse's excrement contained $1\frac{1}{2}$ pints of the bots, and the cure, after repeated trials, is now said to be recognised as thoroughly effective.

TO TELL THE CHARACTER OF A HORSE.

According to a member of the Royal College of Veterinary Surgeons, it is easy to tell a horse's character by the shape of his nose. If there is a gentle curve to the profile, and at the same time the ears are pointed and sensitive, it is safe to describe the animal as gentle, and at the same time high-spirited. If, on the other hand, the horse has a dent in the middle of his nose, it is equally as safe to set him down as treacherous and vicious. The Roman-nosed horse is sure to be a good animal for hard work and safe to drive, but he is apt to be slow. A horse with a slight concavity in the profile will be scary and need coaxing. A horse that droops his ears is apt to be lazy as well as vicious.

DISEASES AND DISORDERS OF THE ALIMENTARY SYSTEM.

By WILMOT C. QUINNELL, M.R.C.V.S.L.

GLOSSITIS.—Inflammation of the structure of the tongue, resulting from the action of irritants or from mechanical injury.

Symptoms.—The tongue becomes swollen, tense, clammy, hot, and painful, and, in consequence of its abnormal increase in size, protrudes out of the mouth, and thus renders the action of swallowing difficult.

Treatment.—*Internal:* Laxatives must be given per rectum, potassium nitrate in drinking water; water should always be within easy reach of the patient. Nutritive enemata if required.

Local: Gently irrigate the mouth with warm water; followed by antiseptic and astringent solutions as a wash or gargle for the mouth, which will be found of great service. Scarify the tongue with due antiseptic precautions when the œdema is extensive.

Inhalations of hot-water vapour medicated with carbolic acid or opium are recommended.

PTYALISM OR SALIVATION is an abnormal increase in the amount of secretion and dribbling of saliva from the mouth. Various causes give rise to this condition in the horse, occurring in some local diseases of the mouth, pharynx, throat, and other organs; irritation caused by irregularity of the teeth; foreign bodies in the mouth; and certain drugs and plants.

Treatment.—A careful and thorough examination of the mouth to ascertain cause, and suitable treatment dependent on the assignable cause found.

IRREGULAR TEETH.—The grinders or molar teeth frequently grow irregular, or become so through being chipped by hard foreign materials in the food, or through undue wear become sharp at the edges. In the teeth of the upper jaw it is the outer edge and in the lower molars the inner edge that become sharp. When the upper molar teeth are affected, rubbing the outside of the cheek against them will cause the animal to evince pain, but the most usual sign of this condition is the inability of the animal to masticate properly, from the injury caused to the cheeks or tongue during the movements of the jaws. This imperfect mastication leads to what is commonly termed "quidding"—ejecting a bolus of semi-masticated food; and inability to take sufficient food is marked by loss of condition and unthriftiness.

Treatment.—The sharp edges may be levelled with a tooth-rasp. A dental operation may be necessary; therefore veterinary aid should be procured. A thorough examination of the mouth should in all cases be made. The examination will also permit it to be ascertained whether the irregular condition of teeth is due to caries, the symptoms of which are very foetid breath, hanging the head to one side, and dribbling of saliva from the mouth.

Poultry.

OSTRICH-FARMING.

We have received a letter from Mr. D. O'Connor, Oxley, on the above subject. Mr. O'Connor, who has achieved distinction in the scientific world by his successful introduction of the Queensland *Ceratodus* into Great Britain and France, and who has also succeeded in acclimatising the same weird fish in the Condamine and at Enoggera Waterworks, who also introduced the Gourami from Java, now turns his attention to the possibilities of ostrich-farming in Queensland. He thinks that the present is a singularly favourable time for the introduction of an industry which has never yet been attempted in Queensland. He maintains that we have suitable country and the right climate. This may be so, but we cannot agree with Mr. O'Connor that ostrich-farming would prove a payable industry in this colony.

Until lately, the South African (Cape) Government imposed an export duty of £100 on each ostrich, and £5 on each egg exported. Why was this done? Because the Cape Government became alarmed at an order for 500 ostriches from New South Wales. Why were the Cape folk alarmed? Probably because the trade in ostrich feathers, although at present remunerative to the South African farmers, would cease to become so when competition arose. Mr. O'Connor believes that the friendly relations now existing between Australia and the Cape would induce the Cape Government to allow us to obtain ostriches free of duty. We very much doubt that philanthropy would extend so far, and we further doubt if ostrich-farming would pay anywhere in Queensland. There is an ostrich farm in New Zealand, near Christchurch, which Mr. O'Connor visited, and which is said to be paying. However that may be, we still think that the cost of the birds and the value of the feathers would not be commensurate. The Colombo *Tropical Agriculturist* has received a similar suggestion. This is the reply:—

“OSTRICH-FARMING: WOULD IT DO IN UVA?”—It is suggested to us that one or more of our enforced visitors at the Diyatalawa Camp may have had experience in South Africa of ostrich-farming, and may be able to say whether the uplands of Uva would at all offer a suitable region for the establishment of a farm? Of course the pursuit is usually associated with expanses of flat country; but we do not know that undulating patanas would be objectionable. Sand, and lime, or shells however, are said to be necessary for the birds for the development of bone. Water supply and fresh vegetable food could be managed in Uva. The food of ostriches in Egypt is said to cost 2d. a day. Each adult bird, five years old, is estimated as worth £40. The annual crop of feathers, after three years old, equals about £4 10s. in value on an average, and there are the young ostriches hatched each year to count on against the general expenses. But perhaps there are enough of ostrich farms already in Africa?

Considering the figures above, could a Queensland farmer feed a dozen hens on 2d. a day. To be successful, an ostrich farm according to the Colombo journal, should be situated somewhere about Birdsville, where sand, shells, and lime abound; but what would the food cost landed at that *ultima Thule* of Queensland civilisation? The birds would require to be pampered and fed for three years, and after that an average of £4 10s. per annum would be the return per bird. The death of a five-year-old bird would represent £40 in addition to the expense of bringing it from South Africa. Chicks certainly could be imported, but in this case disease and delicacy of constitution have to be taken into consideration. On the whole we think that goats would be an infinitely better investment.

A more practical suggestion from Mr. O'Connor is the introduction of a bird called the Buffalo Pecker. This bird is very destructive to ticks and other insect pests on cattle, and, as he says, our squatters in the tick-infested districts would hail with delight the arrival of such welcome immigrants, and the opportunity we now have through our returning soldiers to introduce the bird should not be neglected by the Acclimatisation Society.

LARGE FLOCKS OF HENS NOT PROFITABLE.

Large poultry farms have already had an attraction for lovers of poultry-breeding, yet those who have tried it generally pronounce the poultry farm to be a delusion and a snare. Why is this? A farmer's wife has twenty or thirty hens and a rooster or two. She has plenty of eggs and chickens; the birds are all healthy. They roost usually in the open air—wet or dry, cold or hot; yet they rarely suffer from disease, unless a general epidemic should occur. Her hens are a clear source of profit, for they live almost entirely on the unconsidered trifles they pick up on the farm. They have what is essential to health—unlimited run of the paddocks, and keep themselves strong and healthy by chasing grasshoppers and ceaseless scratching in the farm-yard. Naturally, it would be thought, if forty hens pay so well, what would forty times forty do? And the unthinking calculator forthwith starts a poultry farm, perhaps, on a couple of acres of ground. He begins with 100 hens, and for a season he gets plenty of eggs and numerous chickens. Next season he finds the egg-production decreasing; many of his birds die in a most unaccountable manner; and, in the third year, he discovers that poultry-farming is a failure. The reason is clear. A large number of fowls running together, even on an unlimited area of ground, become unhealthy. Fowls are gregarious as ants. They will keep together. Unlike cattle, elephants, and some other wild beasts, they never ostracise one of their number.

Occasionally the "cock of the walk" will drive away another rooster and chase him away from the flock and from his food, but the latter does not go away and mope for long by himself. He watches his chances and comes in for his share of all the good things distributed to the flock, and he generally has a little following of his own on the outskirts of the main flock. Again, when fowls have a very wide range, their tendency is to become wild, and this tendency leads to a diminution in the egg supply. Fowls, such as the plain and scrub turkey, the emu, cassowary, wild duck, and indeed all birds, only lay and sit at certain seasons. They are not continuous layers like the domesticated fowl. So with the latter, if they are allowed to run wild. Eggs are laid only at certain intervals. Then, in a wild state, the fowls only pick up what food pleases them. Much of it is not suitable for forcing egg-production, and it is only when they are under complete control that they will take such food. The only way in which large numbers of poultry can be kept to a profit is to plant separate colonies of, say, twenty to thirty birds on portions of the farm at some distance from each other. Let each colony have its own run of from 2 to 5 acres. Attend regularly to the cleanliness of the separate houses. Feed each at separate intervals, accustoming them to come to a call. See to a plentiful supply of fresh water. Keep the sitting hens separate from the layers, the young cockerels and pullets by themselves, and give the chickens a plot and house of their own. Weed out all the bad layers. Feed maize sparingly, as it induces too much fat, which is prejudicial to egg-production. Vary the food. Fowls thrive best, like all other animals, when they are fed with a variety of suitable food. Give them plenty of garden stuff, such as cabbage and lettuce leaves, and let them have access to a good dust bath. Under such conditions, poultry-farming has a chance of being profitable—not otherwise.

GROUND PUMPKIN-SEEDS FOR FOWLS.

Fowls are very fond of cucumber and rockmelon seeds, and young cockerels will eat them in preference to wheat. They also are partial to pumpkin-seeds broken up small. Where cows are fed on pumpkins there are always large quantities of seed, which are not fed to cattle. These, if cracked small, would form a valuable food for poultry. Those who have tried it say that it increases the fertility of laying hens.

INDIAN RUNNER DUCKS.

Mr. L. E. Overstead, Warwick, writes: My Indian Runner ducks have done very well this season. In August my four breeding ducks laid 86 eggs, in September 102 eggs, and in October 94 eggs. During August one of the ducks showed a decided inclination to sit. Owing to the demand for eggs for hatching being so great, I have not been able to hatch more than one clutch of ducklings. I have ten fine healthy ducklings out of a setting of eleven eggs. I have disposed of twenty-four dozen of eggs for sittings this season. One dozen went to Springsure by parcel post, and of these eight strong ducklings were hatched. Out of eighteen eggs sent to Ideraway (394 miles by train and 30 miles by coach), fourteen ducklings were hatched. Mr. A. Scott, Wanstead Farm, Grantham, got twelve ducklings out of the dozen. I have received another pair of ducks from the South, and intend getting more next winter. Being a most prolific breed, I believe the introduction of fresh blood will prevent them degenerating, as they are sure to do if inbreeding is resorted to.

We publish these results obtained by Mr. Overstead because we desire to see this valuable breed of ducks established in Queensland. The idea first propounded that they do not sit, is erroneous. All ducks sit, but the Indian Runner does so far less often than others. Mr. Overstead's reason for importing fresh stock is only reasonable, as all breeders of stock—whether of horses, cattle, sheep, swine, or poultry—know that inbreeding is inimical to the maintenance of a first-class breed.—Ed. *Q.A.J.*

POULTRY FOR FARMERS.

The following notes from a lecture on poultry as an adjunct to farming, by Mr. G. A. Palmer, a British poultry expert, will doubtless be found interesting to many of our readers:—

LAYING STRAINS.

The subject of building up laying strains was first noticed. The fact of removing eggs day by day keeps fowls laying, and keeping eggs in the nest will bring on the sitting fever. If a hen of good laying strain be selected, and well fed and managed, her pullets will lay more eggs than she does. Then there is the question of selection. Suppose that eight pullets of pure breed be taken, it will be found that they vary much in laying. If the mother produced 150 eggs, some of the pullets will lay 170, and some again only 130 per annum. Therefore next year breed from the best layers, and so on from year to year. In this manner the most surprising results will be obtained. Strain is everything.

VARIETIES.

With reference to varieties, the lecturer stated that more eggs in return for food consumed are obtained from Leghorns and Anconas. The White Leghorn is the most suitable for farmers. The latter, however, is a very wild bird, and will not allow itself to be approached. It is a good forager, and will almost get its own living. On account of its wandering habits there is risk of its being snapped up by foxes.

HOUSING.

Speaking of housing, always avoid draughts and damp. Mr. Palmer does not agree with keeping fowls warm in order to obtain winter eggs. He prefers the south side of the house to be entirely open, and cited the case of a Worcestershire farmer who keeps a large number of poultry in his fields during the winter. This man obtained better results in eggs from his birds which roosted in the open than from those which were housed.

PARASITES.

Hints were given for keeping down parasites, which probably cause the loss of thousands of young chicks every year. Have no fixtures in the houses, so that perches, nest-boxes, &c., may be readily removed and cleaned. The house should be swept down every fortnight with a good hard sweeping brush. Wiping the perches with a paraffin rag would prevent scaly leg, the origin of which is a minute parasite. Limewash the houses twice a year with a mixture of half-pint of disinfecting acid to 2 gallons of lime. Wash with paraffin all crevices and perch-rests.

To remedy scurf in the comb, or white comb, well dress with paraffin the comb and all bare parts once a week.

Pyrethrum, or other insect powders, should be dredged under the wings and feathers of the tail. This, if never made a practice of generally, should be absolutely done both when setting a hen and when first putting young chicks out.

FEEDING.

Feeding was next dwelt upon. The importance of scientific feeding in producing a profitable strain of birds can hardly be over-emphasised. Foods vary very much, and it is necessary to have some acquaintance with their chemical composition if the best system is to be pursued. The composition of an ideal food should include about 15 per cent. of albuminoids, 55 per cent. of carbohydrates, and 5 per cent. of fat.

Oats are almost a perfect food, but for young chickens are rather indigestible. Wheat is perfectly safe, and sharps is capital. Barley is never used whole, except for a couple of days or so when the weather is showery, and the birds suffer from diarrhœa. Barley-meal is only used for fattening. Maize is a most frequent cause of liver disease. The signs are yellowness in the face, much fatness, not laying, and slight diarrhœa. Then the walk becomes somewhat "rocky," the fowls become lame, and death soon ensues. If a *post-mortem* examination be made, the liver is large, discoloured, soft, and greasy, and rubs up between the fingers. The remedy is a dose of salts to start with, followed up with sulphur in the food for about a month.

For a summer food on grass runs give chiefly wheat and oats. This will produce a larger number of eggs than any other grains. Should there be a long dry time, add some peas. These will replace, to some extent, the insect diet which is lacking. Feed once a day only on grass runs in summer.

In winter always give soft food for breakfast, and hard grain about 3 to 4 in the afternoon. The soft food should be principally of sharps. Do not use barley-meal. A slight addition of bran will make the food more crumbly.

Grit is absolutely necessary, and the lack of it will cause indigestion. Flint grit of any kind will do. Old crockery broken up is good, also granite screenings from quarries. Glass sometimes becomes ground to powder in the gizzard and cakes together; death then ensues.

WATER.

Absolutely pure water in an absolutely clean vessel is essential every day for preventing disease.

The preceding remarks refer to fowls with runs. Fowls in confinement must have meat. Fresh butchers' scraps are best; greaves may give a taint to the eggs. Vegetable food must also be supplied. Hang cabbages up in the houses; one of the great difficulties is to give sufficient exercise. Throw a handful of grain in a bucketful of ashes; this will keep the birds scratching for hours. With a laying hen a good hard condition is wanted, not flabby fat.

BONEMEAL.

Bonemeal is an absolute necessity, but at the price of 15s. to 16s. per cwt. is too dear. A bonecutter which will cut the fresh bones is good, but is probably too expensive for fowls in a small way. In the latter case buy bonemeal from an artificial manure works, stipulating that it is for poultry; and, of course, that it has not been treated with an acid. Bonemeal should be mixed with the food; there is then no waste. It provides lime for the shell and phosphates for the yolk; it is the cheapest food, and a poultry farm should never be run without it. Pure bonemeal costs about 7s. to 7s. 6d. per cwt.

Potatoes should not be given too regularly on account of the excess of starch; mix them with other food. Boiled swede is very good. Raw mangels may be given in the spring, after about 1st April. Mashed mangels are superior to potatoes, and not so injurious.

WINTER LAYING.

To encourage winter laying the cold winds should be kept from the fowls by erecting a 2-feet boarding round the pen. Twenty of the best-laying pullets, coming on for laying in October, should be placed in such a pen. A bone with a little meat upon it will give them amusement, and if it be tied up to a perch just above the ground a good deal of exercise may be afforded.

FEATHER-PLUCKING.

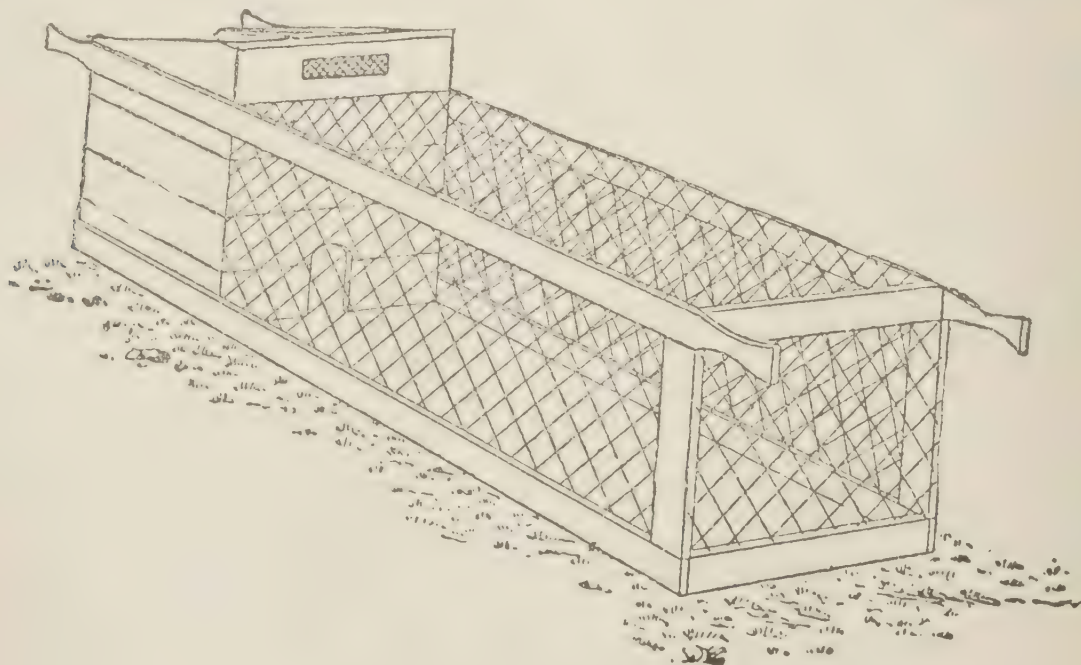
For feather-plucking, which is caused by a depluming mite, smear the bare parts of the birds with a mixture of 1 part of carbolic oil to 20 of water. Take care that it is well applied.

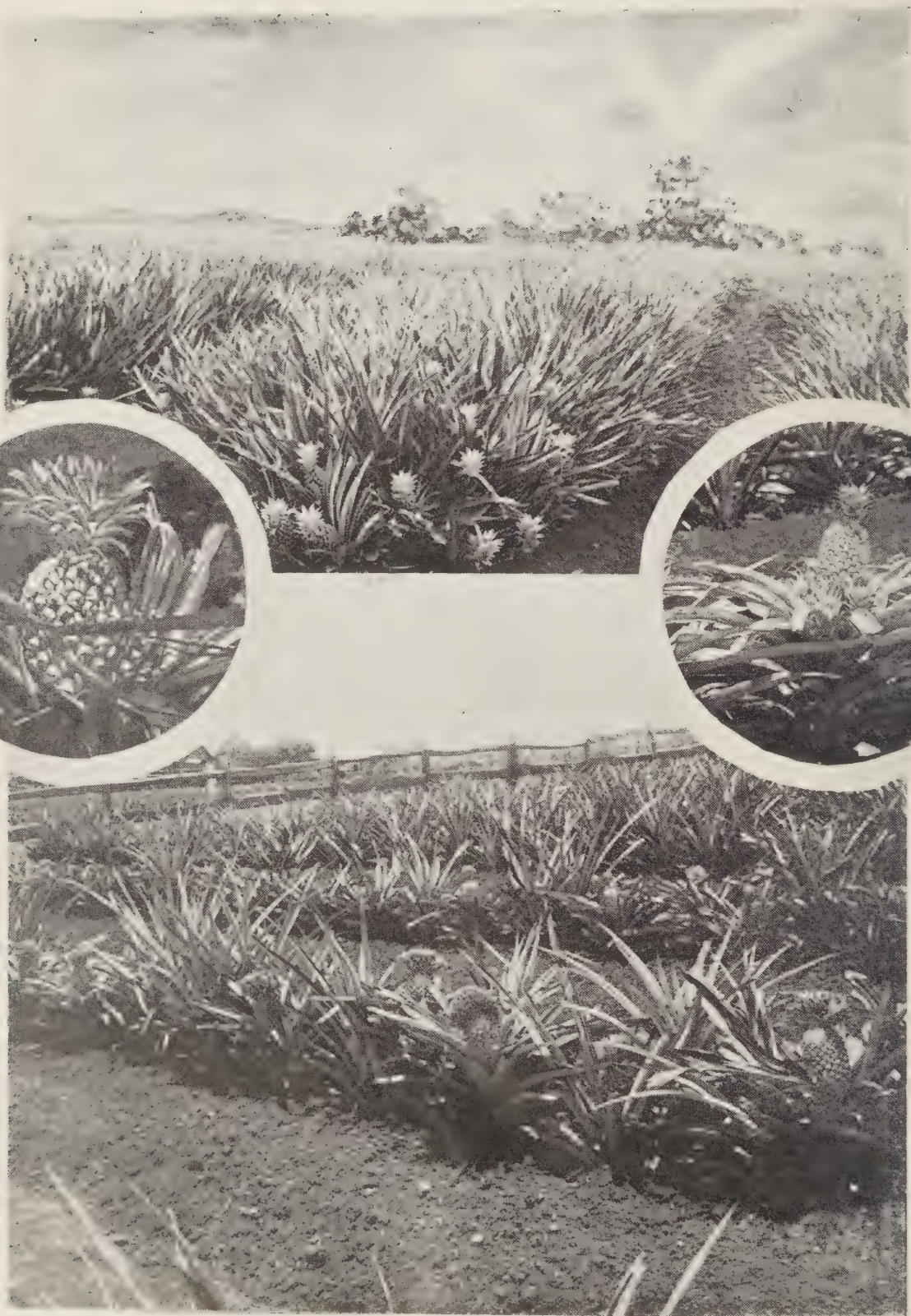
PROFITABLE RETURNS.

With regard to the number of eggs which should be obtained to give a profitable return from fowls, the lecturer said he did not think it would be possible to bring all laying birds up to a 200-egg average per annum. A total of 160 eggs annually would yield plenty of profit. If fowls were kept in the open on a grass run, there should be no difficulty in getting 5s. per head clear profit, which is a greater profit than any other farm stock yields in proportion to the amount of capital invested.

MOVABLE COOP.

The illustration, which is taken by the *Australasian* from the annual report of the New Zealand Department of Agriculture, shows a movable coop for hen and chickens. It is constructed of light timber and wire-netting, and has a covered compartment at one end where the fowls can take shelter:—





PINEAPPLES AT NUDGE.



CARTING PINEAPPLES AT NUDGEE.

The Orchard.

PINEAPPLES.

The townships of Nundah and Nudgee, on the Sandgate railway line, have for many years been the cradle of the pineapple industry of Southern Queensland. Some fifty-three years ago the first pineapples were planted at Nundah by the late Mr. C. F. Gerler, who raised plants from the tops of pines which were imported from the West Indies. This district was then known as the German Station, from its being the home of the early German Lutheran missionaries. The soil was found to be admirably adapted to the production of this delicious fruit, and gradually its cultivation spread over the Nundah district, and extended to Nudgee. In both localities comparatively large areas were planted. There was nothing to interfere with the fruit—no disease; the soil was rich, the rainfall sufficient, and winter frosts were easily guarded against by a slight covering of dry grass during the cold season. This happy combination of favourable circumstances resulted in heavy and regular crops. Tens of thousands of pines annually found their way from these localities to the Brisbane, Sydney, and Melbourne markets, and the pineapple-growers found themselves, if not in affluence, still in most comfortable circumstances. Besides pineapples, the farmers grew fruit, vegetables, potatoes, and corn. The best of cabbages were grown, and are grown to this day, between the rows of pines, where they found the necessary shelter from the great heat of the sun. Last week we saw some very fine cabbages and beans growing in these positions. Usually the crop begins to be gathered in December. This year, however, owing to the absence of rain, the fruit is very backward, especially in the rows which have borne fruit for the last two or three years. Where the two-year-old plants have borne for the first time, the fruit is of good size, and only needs a shower of rain to swell it into goodly proportions. On some of the plantations, heavy crops are no longer gathered. The reason seems to be that for years past the pines have been grown on the same land, with no intermission or rotation of crops. Manure has certainly been applied every year, but in some cases not judiciously, the manure being carted straight from the city stables, and at once applied to the plants. The result of using such unfermented, unrotted, fresh manure is that the plants become heated, and fail to supply the necessary nutriment to the fruit. Again, there has been no change in the plants. Suckers from plants imported fifty years ago were planted year after year, and their descendants still furnish the suckers for new plantings. In the case of sugar-cane, wheat, maize, potatoes—indeed, of most other crops—fresh blood, so to speak, has been periodically introduced, such a course being found necessary to the production of full crops. Rotation of crops has also been adopted in some cases in a perfunctory manner, and some intelligent men have gone so far as to leave portions of their cultivated land to fallow. Neither of these courses appears to have been adopted by the pineapple-growers, and yet its advantages must be sufficiently obvious. Our illustrations are from photographs taken by our artist, Mr. F. C. Wills, at the large pinery belonging to Mr. J. Atthow, and at Mr. T. Fleming's farm, at Nudgee.

Viticulture.

VINTAGE NOTES.

By E. H. RAINFORD,
Instructor in Viticulture.

It is not the writer's intention to again trouble Queensland vignerons with a dissertation upon vintage operations from first to last, as nearly all that can be written about it has been previously published in this *Journal* (see January, 1900), and repetition becomes wearisome. But as there are points upon which, by the care and attention given to them, depends the success or non-success of the vigneron in the quality of the wine he makes, and to which so much apathy is shown by Queensland winemakers, the writer considers it his duty to again call their attention to them if improvement of quality is to be effected.

CLEANLINESS OF PLANT.—All plant used during the vintage, such as fermenting vats, pumps, pails, &c., &c., should be carefully washed and disinfected before commencing operations, and *kept clean*. No portion of the plant that has been used and left idle for some time should be used again without rinsing, otherwise there will be danger of bacterial contamination. A good disinfectant is water acidulated with sulphuric acid. Any article that has the slightest taint of mould should be disinfected with a strong solution of sulphuric acid or other processes (see *Journal*, 1st December, 1898).

ACIDITY OF MUST.—This is one of the most important points to be attended to, and it is almost entirely neglected. It may be said at once that no must intended to be made into claret will turn out a good wine if it is deficient in acidity. The reasons are that the wine proves to be flat and insipid, deficient in bouquet and unstable in colour; moreover, with deficient acidity, should the temperature of the fermenting vat run high, there *must* be excess of volatile acids which are the result of bacterial work. Given a heated medium with low acidity, the germs of disease will begin to multiply and the vinous yeast to languish. No amount of disbelief will change the fact, a thousand times proved; and the sooner Queensland winemakers admit it and improve their procedure the better for themselves.

Claret made from must of full acidity is always fresh to the palate, and its superior bouquet is partly due to the reaction of the acid upon the alcohol forming ethers, but more especially to the natural bouquet of the sound wine not being destroyed or masked by the products of unsound fermentation. The colour is more stable because the acid fixes the colour in wine as mordants do in dyes. If the acidity is insufficient the colour is always liable to be acted upon chemically by the oxygen of the air, which renders it insoluble and causes a thickness or cloudiness often to be observed in Queensland wines. Bacterial fermentation, frequently a result of low acidity of the must, causes loss of sugar and tartar with production in excess of volatile acids and ethers, giving a flat, mawkish, or disagreeable taste and smell to the wine, according to the extent of their work. Moreover, wine that has been invaded by these bacteria will never be sound unless carefully pasteurized; at any moment it may go wrong and cause trouble and loss to the vigneron.

Surely these are points worthy of the consideration of winemakers who have the quality of their wines at heart! Let them study this matter seriously and make a beginning, if only on a small scale, and they will soon be convinced of its importance.

To test must for acidity, certain apparatus is required, not at all expensive, but the operation requires care and exactness in its working, otherwise the

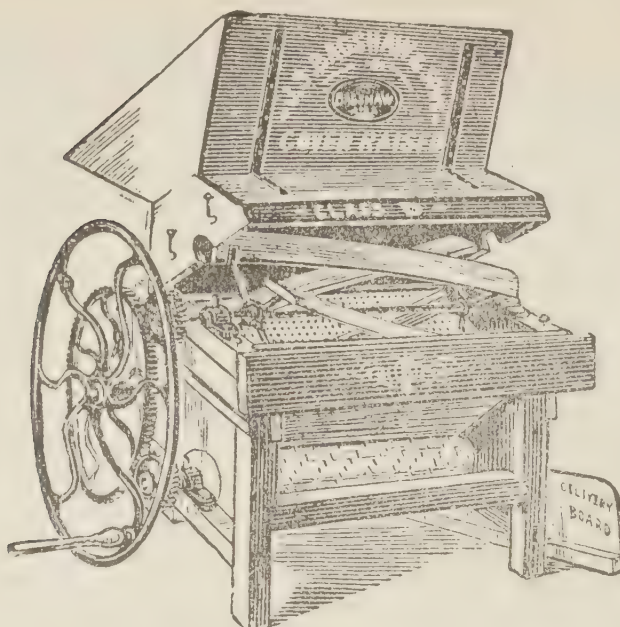
results will be erroneous. A few lessons are sufficient for the most inexperienced to work it. A description here of the *modus operandi* would occupy too much space, but the writer will be pleased to explain the working of it to anybody who desires to learn the process.

The minimum amount of acidity of must to ensure healthy fermentation and sound wine is 8 per mille for ordinary wine grapes, 10 per mille for Bouschet hybrids, and 12 per mille for Lenoir. In the case of the latter, if stability of colour is not aimed at, the acidity can be reduced to ordinary limits. The above degrees of acidity are indicated for light and medium dry white and red wines; for wines which are to be fortified during fermentation the acidity may be neglected. The must should be tested from that in the vat after a certain quantity of grapes have passed through the crusher to ensure working upon an average sample, and the deficiency, if any, of acid made good. There are two ways of doing so—one by addition of commercial tartaric acid, at the rate of 1 lb. per 100 gallons of must for each 1 pro mille of deficiency; another is to crush with the ripe grapes a certain proportion of unripe bunches of the second crop. But this system, although inexpensive, is unsatisfactory, as obviously it is working in a blindfold fashion, and frequent tests of the must would be necessary to see if there was still a deficiency of acidity or the contrary. If the winemaker wishes to utilise his unripe grapes, his best plan is to take an average sample of his grapes before picking and test them. If there is a positive deficiency of acidity, he could pick a certain quantity of unripe bunches with the ripe fruit, and after testing the must in the vat make up any deficiency with tartaric acid. There is a third way of preventing insufficient acidity, and one frequently used where the saccharine density of the must is usually high, and that is to pick the crop before it is quite ripe. A few testings at intervals of a day or two before vintaging will show when the grapes contain the correct amount of acidity. This practice has much to recommend it, but it has also its objections—viz, unless the saccharine density of the must is usually higher than is required for light or medium dry wines there is a loss of sugar, and therefore a corresponding loss of alcohol. Also insufficient ripeness means a deficiency in the natural flavour of the grape so necessary in the production of a good quality wine. Again, testing the acidity of the grapes by picking a few bunches haphazard has an element of uncertainty in it, and is liable to lead to error, unless very carefully done, by choosing fruit of the average ripeness, and not the best in the vineyard. This system is better adapted for the manufacture of white wines than for red.

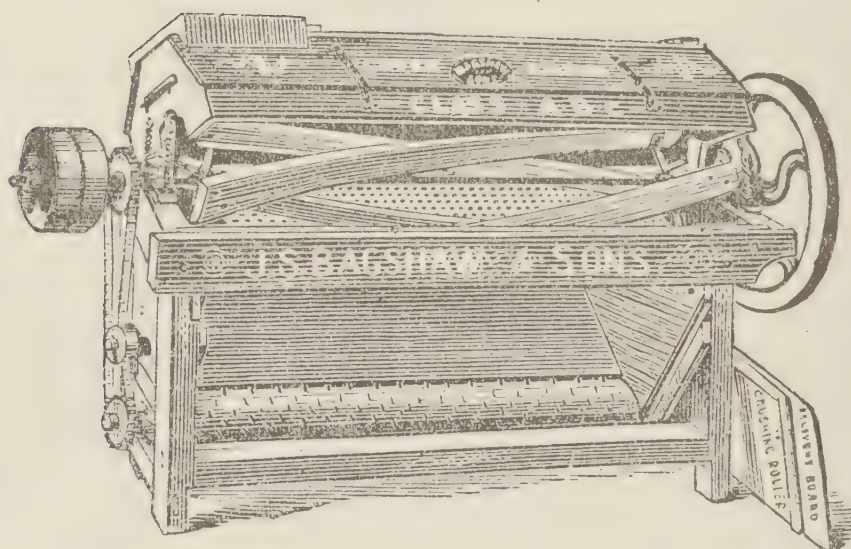
Whenever tartaric acid is added to must, it should be in the form of coarse crystals, obtained from a respectable firm of druggists. Refuse all powdered forms of the acid, as they are largely adulterated with alum, which would disastrously affect the quality of the wine. The acid is best added during the crushing of the grapes a little at a time in the crusher or vat, but in the case of white wines it can equally well be put in the fermentation cask by suspending it in a muslin bag. An addition of 1 lb. to 1½ lb. per 100 gallons of must to light white wines causes them to clear more rapidly as well as improve the quality.

STALKING.—In Queensland, unless very rough, red wines are required, some, if not all, of the stalks should be removed from the grapes before fermentation. The object of doing so is to remove from the must that part of the bunch which is liable to give too much astringency to the wine, as all the tannin required can be obtained from the skins alone. The removal of the greater part of the stalks has the effect also of diminishing the size of the cap in the fermenting vat—an important point, as the greater the bulk of the cap the greater is the amount of heat generated in it during fermentation.

Excellent machines for stalking and crushing the grapes in one operation can be obtained in Adelaide at a reasonable price. An illustration is given of two machines—one a hand, the other a power machine—made by Bagshaw and Sons, of Adelaide.



HAND MACHINE.



POWER MACHINE.

For those unable or unwilling to go to the expense of one of these machines, an easy and inexpensive way of stalking grapes was described in the article for January, 1900, in this *Journal*, which it is not necessary to reproduce here.

STARTING THE FERMENTATION.—It is always advisable to start as healthy a fermentation as possible, and to do this a case or two of selected, sound bunches should be crushed by hand a couple of days before vintaging, and put in a very clean, sweet cask or tub to ferment; this leaven should be added to the fruit as it is crushed, when a quick, healthy fermentation will be set up, which is not the case when fermentation starts in a vat containing a portion of rotten and mouldy fruit. If, however, all the grapes in the vineyard are sound, without any rot, this precaution will not be necessary.

AERATION.—Aeration of the must before, or at the beginning of, fermentation is necessary. To well aerate the must, allow a good fall for the fruit from the crusher to the fermentating vat. If fermentation languishes at first, pump or hand-rack the must from the bottom to the top of the vat. If, on the other hand, the must has been sufficiently aerated, and the fermentation continues normal and vigorous, avoid any further aeration of the must, as harm instead of good will result. At this stage aeration will prejudicially affect the colour of the wine and render it more or less unstable, and there will be in

addition considerable loss of alcohol. Only in the case of a vat "sticking" from abnormal temperature should aeration be resorted to at this stage of the proceedings, and this should rarely be necessary if the must has been sufficiently aerated during crushing and the temperature in the vat carefully watched and prevented from rising too high.

DURATION OF VATTING.—The system adopted by some of allowing the vatting to continue until the density of the must marks zero is irrational, and should cease. In Queensland, vignerons must not blindly imitate the procedure of the central and northern districts of France—that is, if they wish to produce light palatable clarets. In this colony, grapes contain a much greater abundance of tannin, colouring and extractive matter than those of the districts abovementioned, and to imitate their procedure in vatting must give wines overcharged with colour and astringency which years of maturing will not get rid of. To decide upon the duration of the vatting is where the art of the vigneron comes in, and the man who uses his intellect and powers of observation to the best advantage in this matter is the man who makes the best wine, all other things being equal. Besides acquiring the defects already mentioned, the new wine is hourly exposed to the danger of acetification of the cap, a serious consideration in a climate like this which alone should induce winemakers to shorten the vatting as much as possible. Examination of the fermenting liquid from time to time will show when the necessary amount of colour and astringency has been extracted from the skins, and directly that is known the vatting should be stopped and the marc pressed. The press wine should be kept by itself for two reasons: One, because it may contain germs of disease (derived from the acetified cap) which should be kept out of the bulk wine. A careful examination of this wine when clear will show if there is danger or not in blending it with the bulk. A second reason for keeping it separate is: Should the bulk wine already contain sufficient colour and astringency, the pressed wine will not be required, but could be used for blending with other wines defective in those qualities. During vatting keep the cap submerged, as explained in the article of January, 1900, of this *Journal*; also frequently break it up to avoid temperature rising too high in it.

TEMPERATURE OF FERMENTATION.—This part of the operations of wine-making is equal in importance to the acidification, both one and the other having a great influence on the future quality of the wine. The best temperature for must to ferment at is 85 degrees Fahr.; it can rise to 95 degrees without any hurtful effect, but at a higher temperature bacterial work will, in all likelihood, commence. It has already been explained that in a must of too high a temperature the germs of disease begin to multiply and the vinous ferment to languish. A correct acidity modifies the evil, but does not prevent it altogether. When the germs of disease take the floor, there is production of substances detrimental to the soundness and quality of the wine, and destruction of substances favourable to it. For instance, the "tourne" bacteria destroys the tartar and glycerine with production of volatile acid; the colouring matter is also affected; or the mannitic germs may multiply, with the result that sour-sweet wine is produced fit only for the still; in this case the germs change the sugar into mannite and acetic acid. To avoid these troubles then, it is necessary to prevent the temperature of the fermenting must from rising too high, to do which some one of the mechanical cooling appliances should always be at hand. These have been described by the writer in former articles, and need not be described afresh. Bear in mind, however, that the cap is the hottest part of the mass and the point to which the vigneron's attention should be most directed by either constantly breaking it up or refrigerating at that point. When testing the temperature of the bulk of the must, do not be content with testing the first that flows from tap or spigot, but let it flow freely before testing. To test the cap, plunge the thermometer half-way into it for some minutes and read off the degree quickly on withdrawal.

These are some of the more important points in vintage operations which hitherto have had too little attention paid to them in Queensland and in many other parts of Australia, with the result that light, medium, dry, red, and white wines are not made of the quality they could be, putting on one side the question of variety of grape; if, then, vignerons will bear these few hints in mind at vintage time and do their best to follow out the advice given, they will not regret having done so.

STERILISING WINE.

M. Rocques announced that the musts of the last Algerian vintage, sterilised in Kühn sterilisers for ten minutes, at a temperature of 110 degrees Cent. (230 degrees Fahr.), have been preserved in casks of wood and of iron, sterilised themselves with steam under pressure, and have kept very well. They stood a long transport in the month of May, and the fermentation with yeast has given excellent results. In reply to inquiries, M. Rocques added that a heating up to 110 degrees for sixty minutes does not affect the taste of beer, provided that the heating is done by means of steam, the reason being that there is no caramelisation and no oxygen present. The Kühn apparatus is charged with carbonic acid. The new Kühn sterilisers did their work thoroughly, and prevented all contamination during the drawing off of the liquid. The sterilised beer could safely be transported.—*Engineering*.

REMISSION OF DUTY ON WINES IN RUSSIA.

A copy of a circular from the Russian Foreign Minister has been received by this Department, announcing that for the future all foreign wines up to 13 degrees strength will be allowed entry into Russia free of surtax. Thirteen degrees of absolute alcohol in strength is equivalent to 23 degrees of proof spirit.

ONE STEP FORWARD, TWO STEPS BACK.

Under this heading the *Australian Vigneron* of 3rd November, 1900, has an article which we reproduce *in extenso* as being in some particulars peculiarly applicable to the viticultural industry in Queensland:—

It can never be said that the wine industry of New South Wales has owed much to State encouragement, or that it has been coddled and pampered at the expense of the general community. On the other hand, those who have struggled on year after year to establish their enterprises upon a firm and lasting basis, and to promote the development of our natural resources, can claim that by their efforts, in the midst of many discouragements, the industry has made substantial progress. Whatever has been done by the State has been tardily done; whatever has been granted has been grudgingly given; and, when everything is summed up, we find little beyond the official recognition of the industry as a legitimate means to the development of our natural wealth. It is true that we have a State department which is supposed to exercise a fostering care over all matters connected with husbandry and the settlement of our broad acres; and it is also true that a branch of this department devotes its special attention to matters relating to the cultivation of the vine and the manufacture of its produce. The equipment of this branch is not imposing, and the amount of effective work it is able to accomplish is limited, but it at least serves our present purpose, in so far as its very existence puts the wine-growing industry in the position of a State-acknowledged institution—not one which is merely tolerated as a necessary evil, but one which it is thought well to encourage.

Assuming that this is acknowledged, we now desire to direct attention to the anomalous conditions that exist in connection with the administration of the licensing laws. We may say at the outset that we recognise the necessity for a careful supervision over the sale of wine, and think that it is to the

interest of everyone concerned that reasonable restrictions should be placed upon wine-vendors. But there is a very wide distinction between restriction and prohibition. The prohibition we have to complain of is generally decreed in localities and under circumstances where one would suppose the most legitimate demand would exist for the granting of a wine license, whilst where the restriction could with advantage be more rigorously applied the greatest liberty is permitted, and the trade is allowed to fall into disrepute, owing to the want of efficient supervision. We have recently expressed ourselves as opposed to the indiscriminate issue of wine licenses, and there can be no mistaking our attitude when we again affirm that it is to the advantage of the public and of the wine-grower and merchants that the greatest care should be exercised in the granting of permission to sell wine. Once being assured, however, of the respectability of the applicant, and having provided proper safeguards against the sale of vile and injurious rubbish, there should be no hesitation about the free granting of licenses, so that every facility may be offered for the sale of the wholesome products of our vineyards. We do not look with any favouring eye upon the low-class dens where wine is sold simply as a cloak for objectionable practices, or where poisonous concoctions masquerade under the name of Australian wine; but we would like to see wine on sale in every decent restaurant in the city, and in the principal store of every country town.

These remarks are prompted by a recent case at Cowra, where the licensing bench refused a wine license to the principal storekeepers in that town. There was nothing against the character of the applicants, but the sole reason for refusal was that the hotels in the town offered all reasonable facilities for the sale of wine. We had occasion to deal with this matter in connection with a case, practically on all-fours with the Cowra case, that occurred in the New England district some time ago. We then pointed out, as we may briefly repeat, that, in view of the desire of the State to encourage the industry, it is not fitting that people who desire to obtain wine should be subject to the tender mercies of the local publican. An application for wine at country hotels is in many cases met with the statement that they do not keep it, whilst if they do the prices charged are prohibitive, or, at least, upon a scale not calculated to encourage the use of the home-grown product. The hotelkeepers, except in rare instances, do not encourage the sale of Australian wine, and they do not care a dump if they never sell a glass of it—much less a bottle. The hotel is not the place to which people look for good wine, and they know, as a matter of fact, that they cannot get it. The evidence in the New England case went to show that there was no demand for wine because the local hotelkeeper said he was rarely asked for it. Of course not! A chemist might as well say there was no demand for kerosene “because he was never asked for it.”

Broadly speaking, there appears to be no proper conception on the part of the bench, or the police, of the State policy in regard to the wine industry; and until the law is altered, and the administrators thereof have their instructions written so boldly and clearly that he who runs may read, we shall labour under the disadvantages of the present anomalous condition of things. The State professes to hold out a helping hand on the one side, and has a dose of chloroform to smother us with on the other. They lift us one step up, and pull us two steps back.

PROTECTING VINEYARDS AGAINST HAIL.

It seems probable that the time is close at hand when Australian vignerons and orchardists—indeed, all agriculturists—will combine to avert the destruction to their crops by hailstorms. We have frequently drawn attention in this *Journal* to what is being done in Italy, Austria, and France in this direction with most gratifying results. An idea prevails in Queensland that the firing of big guns will have the desired effect, but a glance at the accompanying sketch

and description of the kind of mortar used on the Continent for the purpose will show that guns mounted on ordinary garrison standing carriages which are not intended, as are mortars, for high-angle fire, would be of small utility. Here we are introduced to a simple form of mortar, capable of being fired perpendicularly, and requiring a charge of powder of between 3 or 4 oz. The price at which these weapons are turned out should place them within the reach of a company of neighbouring fruitgrowers working on the co-operative system. The *Australasian*, referring to this subject, says:—

One of the greatest troubles the viticulturist and the fruitgrower have to contend against is the occurrence of severe hailstorms in the spring. Farm crops also often suffer greatly from this cause. Some extensive districts in Europe are liable to be visited by spring hailstorms, and the losses caused by them are often very heavy. —An attempt has been made lately to afford the vineyards some protection from these storms, and, if we may judge by the reports, the efforts have met with a remarkable success. The principle adopted is to fire a peculiar kind of gun skywards on the approach of a hailstorm, and the invariable result is that the hail, instead of destroying a large proportion of the young grapes, descends harmlessly in the form of rain. In what way the hailstorm is influenced by the discharge is not known, but the evidence that the effect is produced is beyond a doubt. The affair has now passed beyond the experimental stage. The first of these mortars were made by M. Alberto Stiger, in Austria, and M. Patrucco in Italy, and they were followed by M. Vermorel

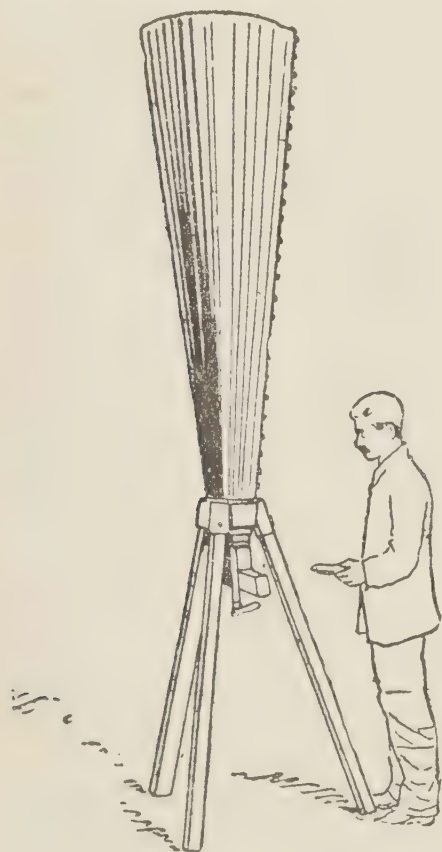


FIG. 1.

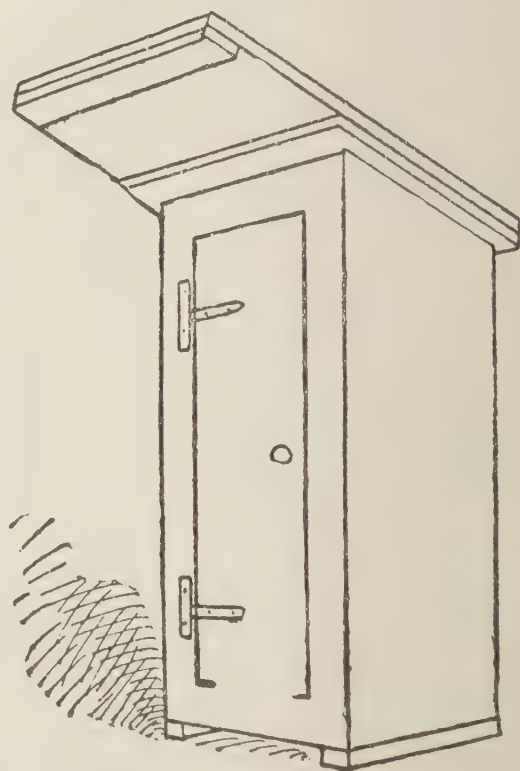


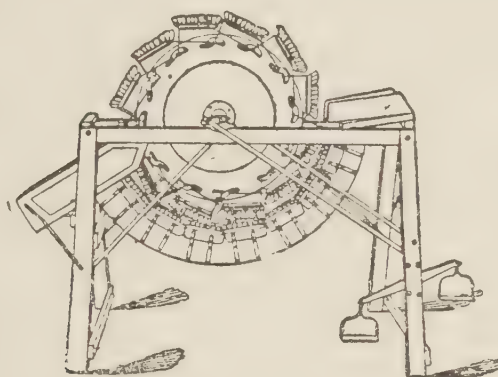
FIG. 2.

in France. The mortar is of a peculiar shape. It is mounted on a tripod, and consists of a portion, which may be called the breech, containing the charge of powder (80 grammes), which is fired by a detonating cap. What represents the barrel of the gun is shaped like an inverted cone, and is made of sheet iron. On the near approach of a hailstorm the gun is fired, and its influence extends over an area of 25 hectares. So certain is the effect that, even some seconds after the hail has commenced to fall, the ameliorating influence of the discharge becomes at once apparent. The grapes within the influence of the mortar are uninjured, while outside that area it was estimated that fully 10 per cent. of the crop was lost. The cost of putting up a mortar, with shed for ammunition, &c.,

is estimated at about 250 francs, and the expenses per annum, including 500 charges, are set down at 79 francs. *The Journal D'Agriculture Pratique*, from which we take our sketch of the mortar, Fig. 1, states that already there are 15,000 of these mortars in use in Italy, where a year before there were only 2,000. The cabin for holding the ammunition (Fig. 2) is placed so close to the mortar that the projecting roof almost touches the long barrel of the gun. What may be used for protecting vineyards from hailstorms may also be employed for protecting orchards and even farm crops. In Europe the expense of establishing these mortars is regarded as a cheap means of insuring the vineyards against loss from hailstorms.

FRUIT BRUSHES.

To improve the appearance of citrus fruits, and thus to obtain a higher market price for them, should be the aim of every fruitgrower. Oranges and lemons covered with scale dead or alive are unsightly objects. All that is needed to give them a bright attractive appearance is to brush off the scale.



To do this with hand brushes is a slow and laborious process. In America most things are done by machinery, and the polishing of citrus fruits is done by a simple machine worked treadle or steam power, an illustration of which is here given.

NUT-GRASS.

The editor of the *Florida Agriculturist* gives the following reply to a correspondent who asks how to get rid of nut-grass: The easiest way to get rid of nut-grass is to move to some other locality where it is not started, but, as we cannot always move when we would like, we have to fight this worst enemy the Florida grower has in the weed line. We have tried to smother it out by covering it 1 foot deep with pine straw, but it would come through. We have hoed and raked and pulled, but still enough remained to get another start. We have heard it said that velvet beans will smother it out in two or three years, and we are trying this plan. From present appearances it would seem that the nut-grass does not thrive as well under the velvet bean as under previous treatment, and we are in hopes that by continuing the growth of velvet beans that we may be able to eradicate the nut-grass entirely. The only other method of eradicating it is to keep the surface of the ground cultivated absolutely clean for a year, not a plant of any kind being allowed to grow. If any of our readers have had experience along this line we would like to hear from them.

Apiculture.

PACKING BEES FOR TRAVELLING.

"Bee," in the *Farmer and Stockbreeder*, gives the following directions for packing bees for a journey:—

The combs upon which bees are to travel must be firmly fixed in the frames, or the jarring and rough treatment the packages will almost to a certainty receive will cause failure. New combs very frequently break down when hives are moved unless they are carefully tied in the frames with tapes. Safe travelling is assured by fixing the sheets upon wires strung across the middle of each frame before being given to the bees; new combs, if in wired frames, then seldom break away.

I will assume that the combs are old and tough, wired, or otherwise made secure. Then the next thing to see after is making the hive secure to the floor-board and elsewhere, to prevent the escape of bees, and giving ventilation. If the floor-board is fastened to the hive sides by nails driven through the plinths of the body-box, secure the front by nailing over the entrance a piece of finely perforated zinc. Upon the frames place a piece of wood cut to fit exactly all over the top, with a hole in the middle, about 6 inches to 9 inches square, covered with zinc. Probably it would be best to fit this in position before closing the entrance, as many bees may escape, even if smoke or carbolic is used, when changing quilts for the board. Lastly, cord the hive tightly, and tie under it buffers—either bundles of straw or straw cushions—and then you will find hives will travel safely from one part of the country to the other.

A simpler way is to use a box to receive the frames and bees, and then when they are settled screw a ventilated lid on, to which is attached a handle. Packed in this way, there is less danger of damage, while the hives can go separately.

QUEENSLAND HONEY IN THE LONDON MARKET.

That large quantities of excellent honey can be produced in Queensland is beyond a doubt, and amongst the apiculturists of this colony many tons are annually produced. The great difficulty is to obtain a profitable market for it. Several attempts have been made to place our honey, both manufactured and in the comb, profitably on the London market, but without success, the principal cause being that the quantity sent on each occasion was insufficient, to attract the attention of buyers who will only deal in the first instance with large parcels. The expenses also have swallowed up much of the profit. As an instance of this, a shipment of honey to the London market in 1895 is recorded in the Department of Agriculture consisting of forty-two cases, each case weighing 56 lb. The gross price realised was from 15s. to 28s. per cwt., from which had to be deducted charges amounting to £10 19s. 8d. This may be looked upon as a fair example of the results attending the shipment of manufactured honey.

The latest shipment of 1 ton was sent away from Brisbane in May last and was reported on by Messrs. Weddel and Co., who stated that the honey was of good even colour, with fair flavour; but most of it rather thin, probably owing to the hot weather in England at the time of its arrival. There is very little demand for honey during the summer and autumn in London and other great cities of Great Britain; therefore it would have to be kept for a few weeks till the cool weather, when the honey would probably have set. Messrs. Weddel and Co. quoted nominally (30th September, 1900) the then value of the parcel about 25s. per cwt., and stated that for honey of this class there was always likely to be a fair demand in the London market.

The most profitable product of the apiary is beeswax, which is always in demand at a good price. For white, clean wax, unadulterated, up to £8 per cwt. can be obtained.

The eucalyptus flavour of some Australian samples does not find favour with English buyers. One thing should specially be attended to in shipping honey to London, and that is that only the pure unadulterated article should be sent. Adulteration of any kind is fatal to the establishment of a trade.

Amongst some samples of honey lately analysed by the Department of Agriculture of Western Australia, was one from Queensland.

On this sample the analyst reports as follows:—"Ash, .24 per cent.; moisture, 12.98 per cent.; borax, none; salicylic acid, none. The sample is a genuine honey, so far as the analysis goes, but it may still contain some cane-sugar, the analysis of the sugar not having been made. I should not call this sample a first-class honey, as part of its sugar has been converted into a state (most likely anhydrous) that has made it hard and not easily dissolved in water. The honey appears to be a mixture of several samples, some of which may have crystallised in the comb, or have been heated too high."

The last quotations for honey in the London market were 24s. to 26s. per cwt. for Australian, 27s. for Jamaican, and 40s. for finest Irish.

HOW TO REAR QUEENS.

Mr. G. M. Doolittle, an eminent apiculturist of Chicago (U.S.A.), author of several works on bee-keeping, notably of one on queen-rearing, describes a method of preparing embryo queen cells to keep up the supply of queens. His plan is at once ingenious and effective. He took a wooden tooth of a hay-rake, and whittled it down till it fitted a queen cup, then made a mark on the tooth where the open end of the cell was to come. A small dish of melted wax was then prepared. The end of the stick was dipped into water, and at once lowered into the wax up to the mark. The stick was then rapidly revolved to cause the wax to be equally distributed over the wood. There was now a film of wax on the end of the stick still too frail to handle. Again it was dipped into the wax, this time one-sixteenth less in depth than before. In this way it was dipped and cooled from six to eight times, each dipping being slightly shallower than the previous one. Thus was produced a queen cup with the outer edge thinner than the bees made theirs, while the base was so thick that it would stand much more rough usage than would the cells made by the bees. Then the stick was whirled in the water until the wax was cold, when it was easily detached from the stick. It could then be fastened to the comb by dipping in melted wax. As the bees did not at first accept these cups some royal jelly was placed in each. The amount of jelly used for each cup was about the size of a "BB" shot. The larvæ were then placed in the prepared cells, and a dozen fixed on a frame; the latter was given to a colony preparing to swarm, and left for two days. When the hive was opened the twelve queen cells were under headway. In three days more they were capped, and in due time twelve splendid queens were hatched from them.

The next idea was to have all the queen cells built on a stick or piece of frame-stuff. Each cell was placed at distances of $1\frac{1}{2}$ inches apart. When six were affixed six more were placed on the opposite side, and half-way between the other, so that when the twelve cups were on the cells alternated with each other. This stick of prepared cells was crowded between the side-bars to a frame of comb which had been previously cut, so that the cells would come in the centre of the comb, whilst the ends of the stick slipped through a slot cut in the comb for them.

By this plan any number of queens of the highest type may be reared.

Tropical Industries.

ANNUAL PRODUCTION OF RUBBER.

It has been estimated that the total approximate annual production of rubber is 57,000 tons. Of this amount, 21,000 tons are taken by the United States and Canada, 21,000 tons by the United Kingdom, and 15,000 tons by the rest of the world. The Amazon district produces 25,000 tons; East and West Africa, 24,000 tons; and parts of South America, other than the Amazon district, 3,500 tons.

THE PRUNING OF COFFEE.

Writing last year to *Planting Opinion* on the principles of pruning the coffee-tree, M. A. Chatin recommended a rational method of coffee-pruning, as suggested by a study of the life history of the plant. In order to overcome the habit which the tree has of fruiting principally on alternate years, especially in the earlier stages of its life history, the author recommended the removal of a part of one of the two primary branches of each cluster at the end of its first year of growth and before the appearance of the flower buds.

GREEN MANURES.

By A. A. RAMSAY,
Manager of the Sugar Experiment Station, Mackay.

In the present article it is proposed to give a *résumé* of the work on green manures carried out at the laboratory of the Sugar Experimental Station, Mackay, which has not yet been published.

In Table I. will be found the results of the trials made with (1) cow pea, (2) velvet bean, (3) small Mauritius bean.

The cow pea was planted towards the end of September, 1899, and the analysis refers to the crop as at 29th March, 1900, six months' growth. The velvet bean was planted at the beginning of November, 1899, and the analysis refers to the crop at 31st April, 1900.

The small Mauritius bean was planted in the middle of September, and cut for analysis at end of March, 1900.

These crops were sown in drills; and particulars of this and the growth, &c., have been published in the *Queensland Agricultural Journal* from time to time, and the subsequent treatment of these is detailed in the *Queensland Agricultural Journal*, Vol. VII., Part 5.

The following meteorological data covers the time from sowing to harvesting:—

								Rainfall (Inches).	TEMPERATURE.	
									Maximum.	Minimum.
1899—October	...	...	...	...	...	...	...	24	82·8	62·7
November	...	...	...	...	...	...	...	68	86·7	66·1
December	...	...	...	...	...	...	...	5·91	87·6	70·4
1900—January	...	...	...	...	...	...	...	20·20	84·5	70·2
February	...	...	...	...	...	...	...	1·44	95·0	69·9
March	...	...	...	...	...	...	...	3·51	93·8	71·3

Table I. does not require any explanation. The analyses of the pulses are stated—next the quantities of the various constituents per acre, and finally the money value of such a crop for manurial purposes:—

TABLE I.

	Cow Pea Vine.	Velvet Bean Vine.	Small Mauritius Bean Vine.
Date of planting	28-9-1899	4-11-1899	16-9 1899
Date of harvesting	29-3-1900	3-4-1900	29-3-1900
Yield of vine in tons per acre ...	11·38	18·250	13·600

ANALYSIS OF THESE PULSES.

Moisture	75·150	72·370	72·800
1. Mineral matter	2·954	4·232	3·082
2. Organic matter	21·896	23·398	24·118
	100·000	100·000	100·000
1. Containing { Potash (K ₂ O) ^{·11M}	·2252	·2990	·2883
{ Phosphoric anhydride (P ₂ O ₅)	·0549	·0600	·0837
2. Containing nitrogen (N)	·6309	·8250	·6630
Per cent. nitrogen in dry substance	2·5388	2·9858	2·4375

THE FOLLOWING SHOWS THE QUANTITIES OF THESE INGREDIENTS PER ACRE.

Moisture	8·552 tons	13·208	9·901
1. Mineral matter	·336 „	·772	·419
2. Organic matter	3·492 „	4·270	3·280
	11·380 tons	18·250	13·60
1. Containing { Potash (K ₂ O)	57·41 lb.	122 23 lb.	88·28 lb.
{ Phosphoric anhydride (P ₂ O ₅)	14·02 „	24·53 „	23·62 „
2. Containing nitrogen (N)	160·75 „	337·26 „	201·98 „
	£ s. d.	£ s. d.	£ s. d.
Money value of the potash phosphoric anhy- dride and nitrogen (per acre).	6 9 2	13 10 9	8 8 1

NOTE.—Samples of these three crops (vine and seed), together with the results set forth in this Table I., but represented in a graphic manner, formed part of the exhibit made by the station at the last Mackay show. Visitors to that show have expressed themselves as having been much impressed with this valuable and useful object lesson.

In Table II. will be found analyses of various green manures planted broadcast on 8th March, 1900. The dates when the crops were cut are set forth in the table.

(For details, see previous issues of *Q.A.J.*)

In the case of the Madagascar bean, the yield of vine and roots is omitted for the reason that only two seeds grew to maturity. These two seeds, however, produced 8·69 lb. of vine, ·44 lb. of roots, and 2·38 lb. of seed.

The meteorological data, March to October, 1900, is as follows:—

1900.							Rainfall.	TEMPERATURE.	
								Maximum.	Minimum.
							Inches.		
March	...	...	...	...	...	...	3·51	93·8	71·3
April	...	...	...	...	...	...	2·21	92·3	66·0
May	...	...	...	...	...	...	3·38	85·2	57·2
June	...	...	...	...	...	...	2·16	81·9	51·9
July	...	...	...	...	...	...	2·72	76·9	50·1
August	...	...	...	...	...	...	1·18	86·4	54·4
September...	...	...	...	...	...	...	·63	84·4	58·3
October	...	...	...	...	...	...	·35	91·6	62·8

Table II. is self-explanatory. In this case analyses have been made of both vine and roots, and the results tabulated :—

TABLE II.

—	Narico Bean.		Poor Man's Bean.		Black Mauritius Bean.		Small Mauritius Bean.		Madagascar Bean.	
Date of sowing	8-3-00		8-3-00		8-3-00		8-3-00		8-3-00	
Date of harvest- ing	20-7-00		20-7-00		20-8-00		26-8-00		25-9-00	
	Vines.	Roots.	Vines.	Roots.	Vines.	Roots.	Vines.	Roots.	Vines.	Roots.

Yield of those Crops in Tons per Acre.

	9.59		.37		14.38		.44		15.56		.27		25.59		.57		...		...
--	------	--	-----	--	-------	--	-----	--	-------	--	-----	--	-------	--	-----	--	-----	--	-----

Vines and Roots in Percentage for Whole Crop.

	96.3		3.7		97.0		3.0		98.3		1.7		97.8		2.2		95.2		4.8
--	------	--	-----	--	------	--	-----	--	------	--	-----	--	------	--	-----	--	------	--	-----

Analysis of the Various Crops.

(1) Organic matter	20.07	45.70	20.00	41.31	19.65	46.31	16.48	34.05	30.34	44.99
Ash	2.17	3.70	2.08	4.09	3.25	3.51	2.88	3.35	3.59	2.83
Water	77.76	50.60	77.92	54.60	77.10	50.18	80.64	62.60	66.07	52.26
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
(1) Containing Nitrogen	.6903	.7937	.6510	.7422	.7790	.9967	.6017	.4958	.4987	.4494

For better comparison, these Analyses are calculated to dry matter—

Organic matter	90.24	92.51	90.58	90.99	85.81	92.95	85.12	91.04	89.41	94.07
Ash	9.76	7.49	9.42	9.01	14.19	7.05	14.88	8.96	10.59	5.93
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Nitrogen ...	3.1038	1.6269	2.9483	1.6347	3.4017	2.0006	3.1079	1.3257	1.4699	.9415

Pounds of Nitrogen per Acre in above Crops.

	lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.		lb.
	148.3		6.6		209.7		7.32		271.5		6.0		344.9		6.3		...		...

Money Value of the Nitrogen.

	£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.
	5 0 10		0 4 6		7 2 7		0 5 0		9 4 7		0 4 0		11 14 6		0 4 3		...		...

For the benefit of the uninitiated farmer, the following example will help him to calculate the manurial value of his green crop.

In estimating the yield of the crop, a good method is to mark out in the field, at some distance apart, several plots of exactly 1 or 2 square yards. A peg is driven into the corners of such a plot, and a string tightly stretched from peg to peg. The crop is now cut straight down from the string to the ground, the vine stems being cut off close to the ground, and the whole weighed. The average of all the plots is taken, and from this the weight per acre is calculated.

The following factor will be useful :—Weight in 1 lb. of green crop from 1 square yard × 2.61 = tons of green crop per acre. Suppose the crop to be cow pea, and that a man has 12 tons of vine per acre, and the percentage of nitrogen in the cow pea is .6.

For example, let the weights of three plots of 1 square yard each be—

$$\begin{array}{rcl} (1) & 5 \text{ lb. } 3 \text{ oz.} & = 5.19 \text{ lb.} \\ (2) & 5 \text{ „ } 8 \text{ „} & = 5.50 \text{ „} \\ (3) & 5 \text{ „ } 1 \text{ „} & = 5.06 \text{ „} \\ \hline & & 15.75 \text{ lb.} \end{array}$$

$$\text{Average} = \frac{15.75}{3} = 5.25 \text{ lb.}$$

$$5.25 \times 2.61 = 13.7 \text{ tons per acre.}$$

Then 12 tons = $12 \times 2240 = 26880$ lb., every 100 lb. of which contains

6 lb. of nitrogen; therefore, the 12 tons contain $6 \times \frac{26880}{100} = 161.28$ lb. nitrogen.

Now, in 17 lb. of ammonia there is 14 lb. nitrogen, and in 66 lb. ammonium sulphate there is also 14 lb. nitrogen; therefore, the 161.28 lb. nitrogen

$$= 161.28 \times \frac{17}{14} = 195.8 \text{ lb. ammonia} = 161.28 \times \frac{66}{14} = 760.3 \text{ lb. ammonium sulphate.}$$

PEABERRY AND OTHER COFFEES.

The Santos correspondent of the *Brazilian Review* remarks that when comparing the wasting and drinking qualities of washed coffees (the finest qualities of which were selling at the time he wrote at 9\$000 to 9\$500) with those of superior Peaberries which fetch from 9\$500 to 10\$000, one cannot help feeling rather distressed about the strange and incomprehensible ways in which the coffee trade is carried on. On the one hand, he says, a perfect roasting and tasting produce is offered at prices from 50s. to 54s., whilst for Peaberries full of black beans, cherries, stones, sour beans, and of no roasting merit, and evidently tasting like an ordinary flat bean, good if not regular, there is an eager demand at prices from 54s. to 57s. Evidently *Mundus vult decipi*. If people would only learn at last that round and flat coffee berries grow on the very same bush!—*Planting Opinion*.

HOW TO PICKLE TOMATOES (GREEN).

Seven lb. of tomatoes, 2 quarts of vinegar, 1 oz. of peppercorns, $\frac{1}{2}$ -oz. of cloves, $\frac{1}{2}$ oz. of allspice, 2 oz. of mustard seed. Small, round, green tomatoes are the best for pickling. Pick when quite dry, remove the stalk, and prick each tomato carefully with a skewer to allow a little of the juice to escape. Place on a dish to drain for an hour. Put in a deep earthenware pan and sprinkle salt between each layer; let them stand thus for three days, then wash off the salt and place in dry bottles or jars. Boil the vinegar with the juice that drains from the tomatoes on the dish and the spices gently for fifteen minutes, and then allow it to go cold. When cold pour over the tomatoes, which it must cover; a little chopped onion or shredded celery may be added to the tomatoes, if liked. Tie down with bladder. Ready for use in a fortnight, and excellent served with roast meats.

Small, round tomatoes, 1 quart of vinegar, $\frac{1}{2}$ -oz. of allspice, $\frac{1}{2}$ -oz. of peppercorns. Place the tomatoes in dry bottles or jars. Boil the vinegar and spices, and pour boiling over the tomatoes. Tie down with bladder. Ready in ten days.

Forestry.

WOODS FOR VENEERS.

Prices for fine woods have recently advanced in Europe from 15 to 35 per cent. This rise has been caused by an increased demand for veneers for making furniture, piano cases, musical instruments, &c. The new method of decorating walls with veneers instead of tapestry or wall paper and leather has resulted in the great increase in the demand for fancy woods.

Queensland rosewood, tulipwood, and many variegated scrub woods should now be worth up to 6s. and 7s. per cubic foot. Yet they are yearly being exterminated with the clearing of the scrub lands.

FOREST CONSERVANCY: BRITISH FORESTRY.

Whilst measures are being taken in Australia and in the United States for the regulating of the timber supplies and the management of the forest yet remaining in these countries, Great Britain has become alive to the possibilities attending the planting up of the treeless areas of that country with coniferous trees. The woods and forests of England, Scotland, and Wales only aggregate about 3,000,000 acres. Dr. J. Nisbet, in a new book on British forests, says:—Upon the Chiltern Hills, where beech is extensively grown for the furniture-makers of Wycombe, well-managed beech woods are returning five times and in many cases six times the annual income that the adjoining agricultural land is yielding. In the case of the West Wycombe estate the account-books show that for over 100 years the annual income from the woods has been 30s an acre. These are perhaps the best results that are now obtained in any part of England. In most cases the results are very different, partly owing to want of care, but more oftener to want of knowledge. Forestry is a science that must be studied, and an art that must be practised as much as medicine or surgery. Dr. Nisbet mentions a case of a landowner who, even under his present system of management, is getting more than £1,000 a year out of his woods, and who pays his forester 15s. a week. This means that a capital of over £30,000 in timber is being administered by a man of no education at a wage of £39 7s. 6d. a year; yet the scope for increasing the capital value and the annual yield must be enormous:—

“It can hardly be denied that British landowners as a class are decidedly apathetic with regard to forestry. So far as game preservation is antagonistic to good management of the woodlands, that matter has been fully dealt with in the last chapter. Other three causes, perhaps in some cases equally powerful in this direction, are want of funds, want of encouragement offered by the State to induce landowners to plant waste land, and danger of fires along railway lines. . . . As most landowners have merely a life interest in their estates, and as the calls on their purse are many (beginning with the heavy demand on succession), they have not, as a rule, much money to spare for forming plantations which are only likely to yield substantial returns after their individual tenure of the estate is at an end.

“As matters are, our woods and forests now only aggregate about three million acres, and are so inadequate for the supply of existing requirements in timber and other woodland produce that our imports under these heads amounted to the enormous sum of over twenty-five and a third million pounds sterling during 1899. Of this over five million pounds were for rough-hewn and over sixteen million pounds for sawn or dressed timber, practically all of

it coniferous timber from the Baltic, Scandinavia, and Canada, which might quite well be grown in the British Isles. Making a liberal deduction for the value of labour included in these coniferous imports aggregating over twenty-one million pounds, the undeniable fact is laid bare that Britain annually pays, and principally to foreign countries, no less than between eighteen and nineteen million pounds sterling for pines and fir timber which could quite well be grown in Great Britain and Ireland. There are some sixteen million acres, now practically unproductive, available for this purpose; and if our existing woods and forests were managed on business principles, and State encouragement were given for making large plantations under economical management, Britain might in the future be self-supporting as to all the coniferous wood required for building purposes. . . . If our present three million acres of woodlands were trebled in extent, and were well managed on business principles, in place of being under uneconomic management as game coverts and pleasure grounds, as is now mostly the case with British forests, this would merely be able to supply existing requirements and no more. Nay, even if we had twelve million acres under forest, and all under the best of management, they would probably be just about able to supply the demand for timber likely to exist at the time plantations now formed may become mature. Past experience has shown that the demands for timber are constantly increasing, despite the more extensive use of substitutes like iron and stone for constructive purposes."

VALUE OF TIMBER TO A WATERSHED.

Forestry experiments in California are being conducted by the Arrow Head Irrigation Company of California. The purpose of the experiments is to determine as precisely as possible the value of timber to a watershed. The company's lands include all manner of forest land, heavy and light, old and new growth, and burnt-over and denuded forest tracts. The rainfall on all these lands is accurately measured, and the relative amount of run-off is carefully estimated. As the experiments are being conducted on an extensive scale, results of great value are expected.—*Engineering*.

AUSTRALIAN GRASSES AND TREES IN THE WORLD'S ECONOMY.

By HENRY A. TARDENT,

Manager of the Biggenden Experiment Farm.

The *Agricultural Journal* has often drawn attention to the exceptional value of many indigenous grasses and trees. Few of us, however, give them the attention they deserve. There are probably in nearly every district, and close to our door so to say, many valuable grasses and herbs, thoroughly acclimatised during the thousands of years of the existence of their species, which would, no doubt, do wonders under a proper system of selection and cultivation.

Not only do we not cultivate them, but, with our habit of overstocking paddocks all the year round, we never give the good species a chance of running to seed. Consequently the land is being gradually taken possession of by inferior, useless, or noxious species, and whole districts lose every year in grazing value.

Many nations have shown more foresight and a better appreciation of the value of our flora.

In some of the Western States of America immense tracts of formerly useless country have been reclaimed, and changed into magnificent fattening grounds by the introduction and cultivation on a large scale of our Australian saltbushes.

Our trees have also attracted attention, not only for the valuable timber they produce but also for their great medicinal and industrial properties.

The environs of Rome, formerly so unhealthy on account of malarial fever, are now being gradually reclaimed and made wholesome by a judicious system of agriculture and re-afforestation with suitable trees, mostly of the Australian *Eucalyptus* species.

In a very interesting article, published in the *Journal de Genève*, M. Henri Carreron gives a vivid picture of the wonderful changes wrought by our Australian trees on the Mediterranean shores of southern France. We intend in the following lines to extract from it those facts which are more likely to interest the readers of the *Journal* :—

“A Provençal,” he says, “who had not seen the Côte d’Azur for the last forty years would not recognise it, so changed is the aspect of its vegetation. No more there of those characteristic stunted greyish bushes. They have been replaced on at least one-fourth of the surface of the land by cooling and fragrant forests of huge Eucalypts, which tower high above the thousand-year-old olive and mastic trees. Australia is invading the ancient Provence, the antipodean forest is gradually taking the place of the indigenous species of the old world.”

The penetrating perfumes of the acacias are now mixed with those of the shy violets and gorgeous roses.

The dishevelled heads of the eucalyptus trees spread everywhere perfumes formerly unknown to us. They remind one of a mixture of fir resin and camphor. There is something balsamic in the air. One foresees in it an important evolution; the old deleterious miasmas are doomed. They will disappear for ever under the wholesome effluvia which fill the air. The vigorous growth of these foreigners foretells a general improvement in the sanitary and agricultural conditions of the whole seaside.

Numerous are the species of exotic plants which are now getting acclimatised in that happy Southern France.

Mr. Charles Naudin and the French author, Alphonse Karr, have proved themselves in that work true benefactors of humanity, for it was they who were the initiators of that marvellous evolution.

Whilst writing as a pastime the fascinating books, Karr was devoting the best of his energy and labour to the development of horticulture; and he was the man who inaugurated the trade in flowers of the south, which forms now one of the principal industries of that part of France.

Naudin, who was a member of the Institut de France, carried on, at the Villa Thuret, studies and experiments on the acclimatisation of foreign species, and especially of the eucalyptus. His work resulted in the introduction of a great number of foreign species and varieties, mostly of the *Eucalyptus* family, into the forests, parks, and private gardens of Southern France.

Mr. Carreron himself, in conjunction with Dr. Lade, made laudable efforts to introduce some varieties of eucalyptus from the Acclimatisation Garden of Geneva into the canton of Valais. The following varieties were experimented with: *E. Gummi*, *E. amygdalina*, *E. urnigera*, *E. alpina*, *E. viminalis*, and *E. rostrata*. So far, those experiments have not been very successful. But in the canton of Ticino, an enthusiast, Signor Emilio Balli, has been more fortunate in his efforts, and has good hopes of entirely re-afforesting the swampy delta of the Maggia River, near Locarno.

According to Mr. Carreron, the eucalyptus was first discovered in Tasmania in 1788, by the botanist L’Heritier, followed later on by La Billardiére, who discovered the famous Blue Gum or *Eucalyptus globulus*.

It should be stated that, amongst botanists, Baron Ferdinand von Müller and Mr. Bailey are considered the best authorities on eucalyptography.

The habitat of most of the *Eucalyptus* family is confined to Tasmania and the Australian continent. None are indigenous to New Zealand; whilst the Moluccas, the Isles de la Sonde, &c., have some half-a-score species. Quite

recently a stunted bushy species has been discovered in Tonquin. It is called by the natives *Ydisi*. Agriculturists use it there to render swamps wholesome. Although these bushy species never attain a great height, they grow very quickly.

That rapid growth appears to be the main characteristic of nearly all the species of the family. To that fact is attributed in a large measure their wholesome influence on miasmatic, swampy lands.

Some reach a height of from 400 to 500 feet. They are thus the highest trees in the world, surpassing even the famous *Washingtonias* of California.

Notwithstanding that rapid growth, most eucalypti furnish a timber extremely hard and resistant. It is used for all sorts of work, and the great length of the logs renders it very suitable for shipbuilding. The Australians make from it luxurious furniture, which equals that made of the best mahogany.

At the Colonial Exhibition of 1885 in London, and now at the Paris Exposition, there are pieces of furniture and samples of polished timber which nobody can see without admiring their marvellous beauty.

Another advantage of most eucalypti is that they do not rot in the ground, and can resist the attacks of most insects fatal to other timbers.

That circumstance explains why the Government of India uses them largely for railway sleepers and for shipbuilding. In England this timber is now coming into favour for street-paving.

Every part of the eucalyptus is in some way made use of. The bark is turned into paper and cardboard, unless it be used for tanning leather, to which it imparts a characteristic smell, which protects it against the attacks of insects, and reminds one of the Russian leather. The various resins and gums exuding from the trunk find a use in some industry. For instance, in the dying trade, whilst the various essences extracted from the leaves and twigs are used as excellent dissolvents for various resins and mastics, they are also good insecticides. Mr. Ch. Naudin has used them with success against the foul brood in bee-hives. [We have no foul brood in Queensland. Shall we attribute that immunity to the beneficial influence of our eucalyptus forests?—H.A.T.]

But it is the foliage of the trees which is mostly used as a therapeutic and hygienic agent. The leaves can replace quinine as preventive of fever, and are unsurpassed in diseases of the lungs, in colds, neuralgia, &c.

When dried in the shade, the leaves of many species burn slowly like tobacco leaves. Out of them cigarettes are made which are quite efficacious to cure sore throats, oppression, and asthma. The smell of eucalyptus renders a room wholesome, and drives away mosquitoes. Washing the body with eucalyptus vinegar preserves it from mosquito bites.

Mr Carreron concludes by saying that wherever the eucalyptus has been introduced, the climate has improved, and the soil has become wholesome and cultivable. Hence its popularity everywhere. It is the tree of the future; the tree which will allow of reafforesting so many countries now desolate in consequence of a reckless destruction of the existing forests.

The richest collections of eucalyptus are in the Villa Thuret, at Antibes, and in the magnificent and gorgeous gardens of Mortola, which belong to a benefactor of the Ligurian Provence, the Englishman, Thomas Hanbury. When one walks under the shady alleys of that park, forty hectares (96 acres) in extent, amongst live plants of nearly every part of the world, when one steps on the dead leaves of all sorts of eucalyptus, one feels a strange and delightful sensation. This is especially the case with the leaves of the kind called *citriodora* (lemon-scented gum), the emanations of which remind one of verbena, thyme, and lavender.

Over sixty varieties tower high above the orange-trees and myrtles, the bamboos and magnolias. One of them, the *Eucalyptus leucoxylon*, has its bark covered with bees, which gather there the sweet sap oozing from it. Every species has its special interest, and is the seat of peculiar phenomena.

Industry has taken hold of the eucalyptus, and prepares from it all sorts of hygienic products. In the Algerian Pavilion of the Paris Exposition, there are eucalyptus soaps, eucalyptus tweeds, eucalyptus wadding, &c., which are used against rheumatics, gout, neuralgia, &c. There are also eucalyptus vinegars and all sorts of toilet ointments and compounds.

A Mr. Magnaire holds the patents for France for all the products derived from the Eucalyptus. One of these, the *Eucalyptor*, is said to be efficacious against the phylloxera and mildew of the grape vine; also against the diseases of silkworms, &c.

I hope the above facts, considerably condensed from Mr Carreron's article, will attract the attention of our more thoughtful settlers, which might perhaps be an inducement to them to put a stop to the present wasteful destruction. Perhaps we may ere long find for our scrubs and forests better uses than to burn them to ashes, which are also mostly wasted, although they form one of the most precious fertilisers required by most of our soils.

HOME-MADE LINIMENTS.

In printing what follows, we have no desire to deprive doctors of any emoluments, but there are hundreds, indeed thousands, of people—men, women, and children—living far away from medical help, and these must perforce help each other in the absence of professional healers. How many men have we seen in the bush suffering from rheumatism, sciatica, ulcerated throats, cuts, bruises, breaks, and strains, not to speak of internal troubles, who are compelled to suffer and recover or die as best they can? Therefore a little advice such as that given by the *New York Farmer* cannot be out of place in an agricultural paper:—

It is difficult to find a liniment that will be of more general usefulness than simple camphorated oil, or camphor liniment as it is often called. It is valuable for rubbing on the outside of the throat or on the chest as a gentle stimulant, or it may be used in case of chronic rheumatism, where it must be applied with friction to give any relief. It may be purchased of the druggist, or it may be prepared at home by dissolving 1 oz. of gum camphor in 4 fluid oz. of olive oil. In case of a severe cold, a piece of flannel dipped in camphor liniment and heated and laid over the chest under a layer of cotton batting will seldom fail to bring relief to a little child or even to an older person. Ammonia liniment is a more powerful stimulant to the skin. It is made by mixing $\frac{1}{2}$ oz. of the spirits of ammonia with 1 oz. of olive oil and shaking in a bottle until they are mixed. Apply it with the palm of the hand, using abundant friction.

A compound liniment that is recommended for rheumatism and numbness is made of $2\frac{1}{2}$ oz. of gum camphor, 1 dr. of oil of lavender dissolved in 17 fluid oz. of alcohol. After this add 3 fluid oz. of a strong solution of ammonia, and shake the ingredients thoroughly together in a bottle. Keep it closely corked when not in use. A good liniment for bruises and strains is made of 2 fluid oz. of alcohol, 2 fluid oz. of ammonia, and 2 tablespoonsful of salt. Put these ingredients in a quart bottle and fill it with rain water; shake the bottle every time this liniment is used. Apply it with friction, using the palm of the hand, as the massage nurse does. The efficacy of almost any of the liniments depends considerably on the care and zeal with which it is applied. In all cases the skin should be covered with flannel and often with cotton batting after the liniment has been applied, as it is desirable to keep in the heat of the rubbing. A good healing liniment for chafed skin, burns, or scalds is made of 3 oz. of spermaceti and 1 oz. of white wax melted into 1 pint of olive oil by setting them in a bottle uncorked in a pan of warm water, and repeatedly shaking the bottle, returning it to the warm water until the ingredients are all melted together.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.			1900.									
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.
<i>North.</i>													
Bowen ...	0.56	Nil.	2.92	7.61	0.40	0.88	0.59	0.89	1.14	0.96	0.76	0.12	0.31
Cairns ...	0.74	0.33	4.57	43.06	1.98	8.90	3.77	3.56	1.66	0.20	Nil.	2.44	1.52
Geraldton ...	1.03	Nil.	4.89	62.28	2.36	8.86	8.86	8.33	2.34	1.02	Nil.	2.63	3.17
Herberton ...	0.18	2.75	0.73	11.90	0.23	1.97	2.19	0.57	0.12	0.98	Nil.	0.74	Nil.
Hughenden ...	0.45	1.05	0.33	6.43	1.04	0.01	Nil.	0.11	0.02	2.45	Nil.	0.14	Nil.
Kamerunga ...	...	...	...	...	1.01	8.60	3.25	3.65	Nil.	0.18	0.03	1.42	1.98
Longreach ...	0.27	0.67	Nil.	1.68	0.48	Nil.	Nil.	0.14	Nil.	2.34	0.50	Nil.	Nil.
Lucinda ...	0.02	1.26	1.02	37.35	1.71	4.90	4.44	9.08	1.10	1.04	0.08	0.44	1.33
Mackay ...	0.19	0.49	7.65	20.86	0.65	4.12	2.40	2.89	2.00	3.25	0.74	1.19	0.48
Rockhampton ...	2.35	1.22	11.02	4.53	0.25	1.61	0.93	1.38	0.71	1.70	0.92	2.52	0.53
Townsville ...	0.35	0.16	0.53	21.09	0.07	1.68	0.87	2.31	0.41	0.57	0.12	0.25	0.91
<i>South.</i>													
Barcaldine ...	0.94	0.52	0.04	3.08	0.65	0.09	2.03	1.38	0.29	4.38	1.63	0.03	Nil.
Beenleigh ...	2.53	1.80	7.40	5.42	3.19	3.16	1.25	7.55	2.18	4.77	1.06	1.90	0.26
Biggenden ...	...	...	...	...	0.40	2.81	0.28	3.06	1.43	3.23	0.98	3.07	0.87
Blackall ...	1.20	0.04	0.85	1.73	1.31	0.63	0.63	2.19	0.33	2.21	0.66	0.12	Nil.
Brisbane ...	2.26	2.33	7.61	6.51	5.18	3.37	1.38	5.45	2.68	4.36	0.79	1.52	0.14
Bundaberg ...	1.60	0.06	7.62	4.63	0.86	1.86	1.15	3.97	1.46	5.20	1.14	1.56	3.05
Caboolture ...	2.30	2.23	7.44	3.04	4.18	5.66	1.42	7.04	2.14	3.73	1.56	2.94	1.99
Charleville ...	0.36	0.43	0.16	1.01	0.08	0.79	Nil.	1.15	1.31	1.80	0.13	0.59	0.13
Dalby ...	1.44	1.84	2.89	0.41	6.31	2.80	2.46	2.54	1.29	1.70	1.72	1.67	Nil.
Emerald ...	1.93	1.32	0.40	3.08	1.22	3.97	0.42	2.72	1.15	3.96	0.52	0.35	0.18
Esk ...	2.67	2.25	5.34	1.42	2.34	4.73	1.50	4.78	1.89	2.85	1.39	...	Nil.
Gatton College ...	2.13	3.50	5.87	2.40	4.07	3.13	2.24	4.24	1.15	2.73	1.33	2.81	Nil.
Gayndah ...	2.73	4.59	7.37	2.52	2.07	1.11	1.22	2.57	0.88	3.36	1.42	3.28	3.21
Gindie ...	...	...	...	...	0.57	1.04	0.96	3.01	0.92	3.01	0.55	0.22	0.27
Gympie ...	2.41	0.39	6.44	5.59	1.84	2.76	1.05	3.63	0.82	3.34	0.84	5.67	0.18
Ipswich ...	2.04	3.46	4.66	2.79	1.66	1.85	1.47	4.73	1.45	2.25	1.17	1.37	0.01
Laidley ...	3.17	2.40	6.50	0.64	3.15	2.87	1.94	4.36	1.41	2.28	1.08	...	Nil.
Maryborough ...	1.20	0.51	4.13	4.88	1.78	3.26	1.17	4.33	1.21	4.32	0.57	3.55	1.22
Nambour ...	2.87	3.03	11.11	4.07	5.64	4.67	2.78	7.77	1.35	3.42	1.81	4.15	0.52
Nerang ...	1.99	1.42	6.31	4.60	3.37	3.06	0.47	18.28	2.84	7.74	1.08	2.79	0.26
Roma ...	0.35	1.27	0.99	0.43	1.52	4.40	0.23	2.07	2.14	2.14	1.05	0.77	0.66
Stanthorpe ...	1.36	0.86	3.22	2.62	4.81	1.87	1.70	3.17	1.22	2.26	1.50	3.98	0.23
Taroom ...	0.83	3.32	0.65	1.78	3.65	2.92	2.11	2.55	1.40	2.46	2.91	2.26	1.47
Tambo ...	0.79	0.08	0.66	2.28	1.55	0.30	0.02	2.94	1.49	1.75	0.59	0.19	Nil.
Tewantin ...	3.36	0.46	8.22	1.69	4.87	5.36	1.02	5.90	3.03	5.89	1.97	5.78	1.48
Texas ...	0.97	0.74	2.67	1.56	3.39	1.63	1.48	3.35	1.86	2.72	0.66	2.68	0.35
Toowoomba ...	1.43	2.36	4.75	1.01	2.90	2.87	2.00	4.67	1.69	2.47	1.35	1.95	0.43
Warwick ...	2.48	1.67	3.83	1.84	4.19	1.93	1.01	3.31	1.23	1.99	1.11	2.72	0.13
Westbrook ...	...	...	...	...	3.71	1.78	1.81	3.04	1.16	1.85	1.18	0.60	0.04

A. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, choicest, £5 12s.; second quality, £5 4s. per cwt.; brisk sale. Danish, £6 5s.; Canadian, £5 2s. to £5 4s.

CHEESE.—American, £2 12s. to £2 13s.; Canadian, £2 14s. to £2 15s.; New Zealand and Australian, no quotation.

SUGAR.—Refined, £16 to £17 10s per ton; syrups, £11 to £14; German beet, 88 per cent., 9s. 9d. per cwt.

SYRUPS.—Finest, 11s. to 13s. per cwt.

MOLASSES.—3s. 6d. to 5s. per cwt.

RICE.—Rangoon, £7 10s. to £7 15s. per ton; Japan, £14 to £14 10s.; Java, fine to finest, £15 to £17; Patna, fine, £20 to £24 per ton.

COFFEE.—Ceylon plantation, 102s. 6d. to 103s. per cwt.; smalls, 58s.; Peaberry, 80s.; Santos, 36s. to 67s.; Mocha, 88s. to 112s.; Jamaica, finest, 100s. to 120s. per cwt.

ARROWROOT.—St. Vincent, 2½d. to 5½d.; Natal, 6½d. to 7½d.; Bermuda, 1s. 9d. to 2s.

WHEAT.—Australian, 29s. 9d. per 496 lb. (3s. 7½d. per bushel). Parcels afloat, 29s. Visible American supply is estimated at 85,591,000 bushels.

MALTING BARLEY.—English, 33s. to 36s. per 448 lb.; Californian, 26s. 6d. to 27s. 6d. per 448 lb.

OATS.—New Zealand, 26s. to 27s. per 384 lb.; Canadian, 15s. to 15s. 6d. per 320 lb.

GINGER.—Jamaica, £3 10s. to £4 per cwt.; Bengal, rough, 29s. to 30s. per cwt.; Japan, 25s. to 28s. per cwt.

PEPPER.—Capsicums, 20s. to 90s. per cwt.; chillies, 37s. to 55s. per cwt.

TOBACCO.—Virginia Leaf: Common to middling, 2½d. to 6d. per lb.; colory and good to fine, 4½d. to 1s. 1d. Strips: Common to middling, 4d. to 8d.; good, fine, and colory, 8d. to 1s. 3d. Kentucky Leaf: Common to middling, 2½d. to 5½d.; colory, good, and fine, 7½d. to 9½d. Strips: Common to middling, 3½d. to 7½d.; good and fine, 8d. to 11d. Maryland and Ohio, 4½d. to 10d. Negrohead and Cavendish: Common and heated, middling to good, fine, bright and soft pressed, 4d. to 1s. 3d. Columbian, 3d. to 2s.; Java, 4d. to 10d.; Turkey, 4d. to 11d.; Japan, 5d. to 8½d.; China, 5d. to 7d.; Sumatra, 7d. to 5s.; Latakia, 4d. to 11d. nom.; Paraguay, 3d. nom.; Greek, 3d. to 5d.; German and Dutch, 4d. to 1s. 4d.; Manilla, 3d. to 4s.; Havannah, 8d. to 5s.; Cara and Cuba, 5d. to 2s.; Esmeralda, 7d. to 10d.; cigars, 1s. 3d. to 40s.; cheroots and cigars, Manilla, 2s. to 3s.

WINE.—Australian Burgundy, 13s. per dozen bottles; Waratah, 18s. per dozen; fair red Australian claret in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon. The trade in Australian wines is not suffering the diminution observable in some of the other branches. The first seven months of the year show an increase of 5,223 gallons.

GREEN FRUIT.—Bananas, 12s. to 14s. per bunch; pineapples, 3s. to 5s. each; grapes, Almeria, 11s. 6d. to 12s. 6d.; choicest, 23s. to 25s. per barrel; oranges, Almeria, 15s. to 25s. per 420; lemons, Naples finest, 40s. to 45s. per 420.

COTTON.—Sea Island cotton is worth in the seed in Florida 2d. per lb., or 8d. per lb. for ginned cotton; clean uplands, in London, 6½d. per lb.; in Japan, 4½d. per lb.

COTTON-SEED.—£7 12s. 6d. to £9 per ton. Cotton-seed oil, refined, £24 10s. to £25; crude, £23 per ton.

OILCAKE.—Cotton-seed, £4 17s. 6d. to £5 per ton; decorticated, £7 to £8 per ton.

EGGS.—French, 12s. 6d. to 13s. per 120; Italian, 10s. to 10s. 6d.; Russian, 5s. 6d. to 8s. 6d.; Danish, 13s. to 15s. per 120.

HONEY.—Finest Irish, 45s. per cwt.; Jamaica, 28s.; Australian nominal, 24s. to 26s. per cwt.

BEESWAX.—1s. 2d. to 1s. 8d. per lb.

LINSEED OIL.—32s. to 33s. 6d. per cwt.

LINSEED CAKE.—£8 12s. 6d. to £9 per ton.

OLIVE OIL.—£33 to £37 per ton; eating oil, £50; Lucca oil, 3s. 9d. to 5s. per gallon.

HEMP.—Riga, £34 per 336 lb.; sisal, £23 per ton.

LINSEED.—50s. to 60s. 6d. per 410 lb.

RUBBER.—Prices lower; Para, fine, 4s. 1d. to 4s. 1½d. per lb.; West Indian, 2s. to 2s. 10d.; Mozambique, 3s. 1d. to 3s. 7d.

WOOL.—London Sales: Wool sales closed firm and active, with brisk competition. Out of the net quantity of Australian and Cape wools available for disposal, 158,000 bales have been sold for home consumption, 71,000 bales for the Continent, and 5,000 for America, leaving a total of 133,000 bales to be carried forward to the next series opening on 15th January next. The position of the markets, as compared with the closing rates of July last, shows a decline of 10 per cent. for good greasy merino and fine crossbred wools, 10 to 15 per cent. for medium inferior greasy wools and scoured merino wools in general, and 5 per cent. for medium and coarse crossbred wools.

FROZEN MEAT.—The following are the latest quotations (15th December) for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.				Dec. 8.	Dec. 15.
(Crossbred Wethers and Merino Ewes.)					
Canterbury	...	...	...	4 $\frac{3}{4}$ d.	4 $\frac{3}{4}$ d.
Dunedin and Southland	...	...	...	4 $\frac{1}{2}$ d.	4 $\frac{5}{8}$ d.
North Island	...	...	...	4 $\frac{3}{8}$ d.	4 $\frac{1}{2}$ d.
Australian Mutton.					
(Crossbred and Merino Wethers.)					
Heavy (over 50 lb.)	...	...	...	3 15/16d.	3 15/16d.
Light (under 50 lb.)	...	...	...	3 9/16d.	3 $\frac{5}{8}$ d.
River Plate Mutton.					
(Crossbred and Merino Wethers.)					
Heavy	...	...	...	4d.	4d.
Light	...	...	...	3 11/16d.	3 $\frac{3}{4}$ d.
New Zealand Lambs.					
Prime Canterbury (32 lb. to 42 lb.)	...	...	...	6d.	} None offering
Fair average	...	...	...	5 $\frac{1}{2}$ d.	
Australian Lambs.					
Prime (32 lb. to 40 lb.)	...	...	...	5 $\frac{1}{4}$ d.	5 $\frac{1}{8}$ d.
Fair average	...	...	...	5d.	4 $\frac{3}{4}$ d.
New Zealand Frozen Beef.					
(Fair Average Quality.)					
Ox, fores (100 lb. to 200 lb.)	...	...	...	3 $\frac{3}{8}$ d.	3 $\frac{3}{8}$ d.
Ox, hinds (180 lb. to 200 lb.)	...	...	...	4d.	3 15/16d.
Australian Frozen Beef.					
(Fair Average Quality.)					
Ox, fores (160 lb. to 200 lb.)	...	...	...	3 3/16d.	3 $\frac{1}{8}$ d.
Ox, hinds (160 lb. to 200 lb.)	...	...	...	3 9/16d.	3 9/16d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies of inferior quality.

BACON.—Irish, 49s. to 57s.; American, 48s. to 50s.; Canadian, 50s. to 57s. per cwt.

HAMS.—Irish, 72s. to 84s.; 46s. to 48s. per cwt.

HIDES.—Strong demand for Queensland hides. Meat Company's hides, 5d. per lb.

At the sales of woolled sheepskins, 4,264 bales were offered, and the whole quantity sold. Prices for combing merinos and fine crossbreds advanced $\frac{1}{2}$ d. to $\frac{5}{8}$ d. per lb, clothing merinos $\frac{1}{2}$ d., and coarse crossbreds $\frac{1}{4}$ d.

TALLOW.—Mutton, fine, 28s. 6d.; medium, 26s. 6d. per cwt. Best beef, 28s.; medium, 26s. 6d. per cwt.

RAINFALL AT CLERMONT.

Month.	1887.		1888.		1889.		1890.		1891.		1892.		1893.	
	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.
January ...	5.23	10	2.62	3	4.01	7	11.75	14	11.37	20	3.69	8	1.67	4
February ...	5.09	13	7.35	18	0.58	2	6.85	11	7.49	6	1.00	3	3.35	12
March ...	7.25	12	Nil	...	1.76	4	9.29	20	5.26	10	0.58	3	1.57	9
April ...	1.42	4	Nil	...	4.81	15	1.28	5	1.84	7	1.71	5	4.44	7
May ...	0.55	2	0.21	2	2.01	4	3.68	12	2.06	8	0.90	3	1.22	3
June ...	0.59	3	Nil	...	0.99	4	2.06	5	4.06	3	0.24	2	2.80	5
July ...	1.42	2	Nil	...	2.10	5	0.42	4	0.02	1	1.67	2	0.82	5
August ...	2.63	3	0.26	2	0.03	1	0.85	3	1.09	3	Nil	...	4.37	6
September ...	0.85	2	0.02	1	2.07	4	4.12	4	0.32	3	0.96	8	0.31	5
October ...	0.01	1	1.10	1	1.32	3	1.68	4	1.18	5	3.12	5	1.07	7
November ...	1.18	3	2.00	4	5.30	10	0.11	1	0.65	6	2.33	5	0.60	6
December ...	4.69	5	4.25	3	6.78	10	7.08	5	2.80	8	2.11	8	1.76	7
Totals ...	30.91	60	17.81	34	31.76	69	49.17	88	38.14	80	18.31	52	23.98	76

Month.	1894.		1895.		1896.		1897.		1898.		1899.		1900.*	
	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.
January ...	4.59	6	4.74	14	9.99	7	6.25	13	12.62	13	7.99	10	3.97	14
February ...	5.53	8	1.96	11	16.85	19	0.83	4	14.85	16	3.12	6	0.79	1
March ...	2.28	9	Nil	...	0.33	3	2.30	2	1.31	6	5.12	9	1.68	4
April ...	3.94	8	1.41	2	0.21	2	Nil	...	0.16	3	2.11	4	1.76	3
May ...	2.26	5	0.91	3	0.41	3	Nil	...	0.50	4	1.93	3	2.41	6
June ...	4.04	6	Nil	...	0.76	3	3.32	4	0.76	5	0.05	1	0.96	2
July ...	Nil	...	1.93	9	1.45	3	0.11	2	0.26	2	1.63	8	2.65	8
August ...	1.08	1	0.02	1	1.91	4	1.20	3	0.10	3	2.16	5	0.73	1
September ...	3.28	7	0.32	3	0.13	1	0.14	4	2.80	5	0.25	1		
October ...	3.38	7	0.96	5	Nil	...	2.54	6	0.19	2	1.25	8		
November ...	0.22	5	1.60	7	0.90	3	1.73	5	0.28	3	1.42	3		
December ...	2.23	10	5.11	7	1.33	4	2.80	9	3.57	3	0.32	1		
Totals ...	32.83	72	18.96	62	34.26	52	21.22	52	37.40	65	27.35	59	...	...

* 14.95 inches for 39 days.

RAW COTTON TRADE.

According to a memorandum received at the Board of Trade from the United States Bureau of Statistics, the record of cotton exportations and movements for 1899-1900, which are measured usually by what is termed the "cotton year," ending with the month of August, may now be compared with those of the preceding year. These reports, which are of a preliminary nature, include about 98 per cent. of the total exports of cotton, and, as the comparison of the present year is made with the similar reports of preceding years, the relative showing for the various years is a fair one. A study of the exportation of cotton supplied by these figures shows that the exports of raw cotton during the cotton year ending with August, 1900, are greater in value than in any preceding cotton year since 1892, and the average price per lb. greater than on any occasion since 1893, except in the year 1896.

The average export price of cotton in August, 1900, was 9.7 cents per lb. ($4\frac{3}{4}$ d.), as against an average of 5.6 cents ($2\frac{3}{4}$ d.) during the year 1899, and 5.8 cents (over $2\frac{3}{4}$ d.) in 1895, and is higher than the average of any year since 1891.

Animal Pathology.

The article on tumours, which appeared under the above heading in the December issue of the *Journal*, was from the pen of Mr. W. C. Quinnell, M.R.C.V.S.L., of the Agricultural Department.

General Notes.

COLLECTING MUSHROOMS AND OTHER FUNGI.

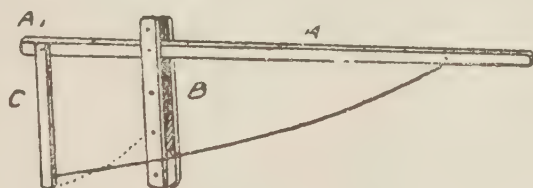
Mr. C. Bühner gives in a Swiss paper the following directions to preserve mushrooms for museums and private collections:—As soon as possible after the mushrooms are gathered they should be immersed in a 10 per cent. solution of formal (*formic aldehyde*).

As a rule, the liquid formal of commerce is 40 per cent. strong; it should be therefore diluted in the proportion of 1 volume of formal to 3 volumes of water.

The most delicate mushrooms are thoroughly preserved in that solution, which has, moreover, the advantage of being very inexpensive. Experience shows that only the more delicate hues of some varieties become slightly faded.

A WAGON-JACK.

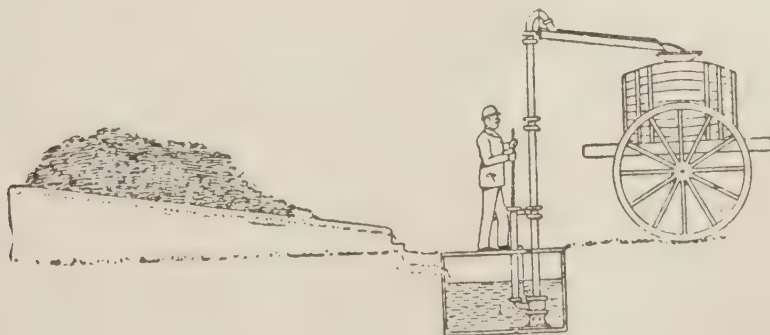
A wagon-jack is a convenient thing to have on a farm. The accompanying diagram shows one that is simple, strong, and readily made. The lever is of firm, hard, and well-seasoned wood, 7 feet long and double at the point A, in order to make it strong and to enable the front post C to swing back past the fulcrum B. The latter is $2\frac{1}{2}$ feet high, double, but left open at the top, and closed below with a piece of 1 inch by 5 inches wood. The front post C is



single, and long enough to elevate the front part of the lever higher than it is at the fulcrum. The front post is self-adjusting and movable. A support is thus provided on both sides of the axle. To drop the axle and wheel to the ground, bear down on the lever A and pull the cord, and the post C will be drawn up in the direction of the dotted lines. The post C and the lever A are held in place by $\frac{1}{2}$ -inch bolts.—*Farm and Stockbreeder*.

A TYPICAL MANURE HEAP.

The accompanying sketch represents a typical manure heap. The cesspool is advantageous in so far as it enables the farmer either to pump the manure periodically over the heap or liquid manure the land:—



TO GET RID OF RATS.

A very simple, and it is said efficacious, mode of ridding a house of rats and mice is given by the *Canadian Grocer*. It is based on the intense aversion which rats and mice have for the odour of mint. All that is required is to sprinkle a little of the extract of mint in the haunts of the vermin, and they will quickly leave the premises. The weak point in this remedy is that it does not destroy the rats and mice, it merely drives them from one place to another.

HOW TO FREE A TOWN FROM MOSQUITOES.

In view of the now established connection between mosquitoes and malaria, the following extract from the *British Medical Journal* is likely to be read with interest by many of our readers, especially in Calcutta. Expert opinion is pretty well unanimous that the mosquito pest can be controlled. All that is wanted is united action. It is a fair field for village improvement societies. At a meeting of the Societa Medico-Fisica Universitaria of Sassari, on 23rd March, Dr. C. Fermi gave an account of certain experiments made in Sassari, in conjunction with Dr. Lumbau and Dr. Cossu-Rocca, with the object of freeing the town from mosquitoes. He was able to discover all their breeding-places in different parts of the city, in drains, cisterns, puddles, &c. The method adopted was the destruction of the larvæ by means of petroleum placed in the breeding-grounds twice a month. The mosquitoes were destroyed in shops by means of chlorine, and in houses by means of ulicides, such as a mixture of pyrethrum, chrysanthemum flowers, valerian, and *Calamus aromaticus*, or the "zanjoline" of Celli and Casagrandi. The results obtained were so satisfactory that Dr. Fermi concludes from them that it is always possible to free a town from mosquitoes unless the conditions are exceptionally unfavourable—as, if it be situated in the midst of a swamp. He estimates the expense of freeing a town of 50,000 inhabitants at 1,000 to 1,500 lire (about £67 to £100 a year. This includes the wages of the staff required to carry out the measures prescribed.—*Indian Gardening and Planting*.

PROPORTION OF LIVE TO DEAD WEIGHT.

The imperial cwt. of 112 lb. live weight may be taken in an average fed animal as representing 64 lb. of carcass or dead weight. Prime animals would give a larger percentage of carcass weight, perhaps as high as nearly 72 lb. in very choice bullocks, and inferior cattle a less proportion, down to 60 lb. per cwt. of live weight.

TO MEND A WATERING-CAN.

To stop the holes caused by rust in a watering-can, dry the can thoroughly, dip a piece of linen or cotton rag in copal varnish and put it over the leaky place inside. When thoroughly hardened, give a coat of paint to the whole can, outside and in.

TO KEEP OUT MOSQUITOES.

1. Oil of pennyroyal scattered about in small quantities. This is best sprayed about the room with a perfume atomizer.

2. Take of gum camphor a piece about one-third the size of an egg, and evaporate it by placing it in a tin vessel and holding it over a lamp or candle, taking care that it does not ignite. The fumes will soon fill the room and expel the mosquitoes.

3. Carbolic acid has recently been successfully used for extermination of mosquitoes and flies. A small piece of cloth saturated with the acid was hung in the room, and in two hours the flies had entirely disappeared. In the evening the acid was tried in the kitchen where the mosquitoes were very troublesome, and there it met with the same success.

THE DIVINING ROD.

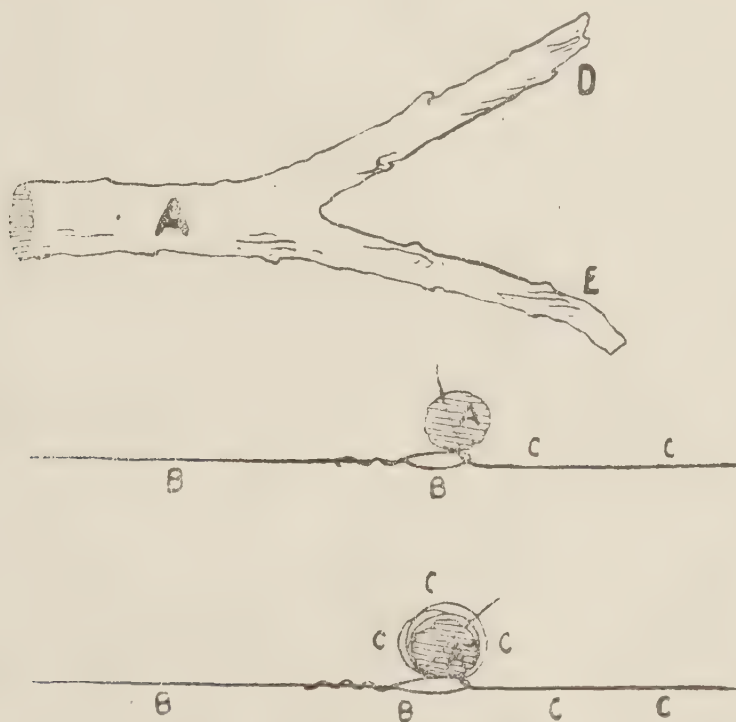
At Weston-Super-Mare, in England, there is a celebrated water-finder, Mr. Gatacre. He has just visited an estate in Scotland with the object of discovering water. He cut a twig from a tree, and, using same as a divining rod, located several springs on the estate about 60 feet in depth, and told the quantity of gallons they would yield hourly.

KICKING HORSE IN A STABLE.

A writer in the *Orange Judd Farmer* gives this very novel way of stopping a horse from kicking in the stable:—Fill a grain sack half-full of sand and swing up to the ceiling with a rope, so that the sack will hang just where the heels of the horse will have good play upon it. Tie the horse in the stall with a good strong rope and let him kick. At the first kick the bag will swing away and return, giving the horse as good as he sent. For the next minute or so there will be a battle royal, but the sack will hold its own, returning all it received with interest. The horse in bucking against the real thing will soon come to a realisation of that fact, and will be thoroughly cowed. Leave the sack behind him for a week or so, and then remove. If he ever tries to get into his old habits, give him another punch bag to exercise with.

A SIMPLE WIRE-STRAINER.

Few things are more useful than a simple contrivance for straining up wires which have broken in an old fence. It is the usual practice to mend the break, and leave the fence at that. This will, of course, allow sheep to fall through the fence whenever they may fall or press against it. Most strainers are made to tighten up the wire at the post, and are far too cumbersome to carry about. The method illustrated will strain between the posts wherever the break occurs. It may also be used at the straining post, and at either it is as rapid a plan as any. Its chief merit lies in its simplicity, and the ease with which it may be carried. It will ride of itself on the wither of one's horse; but, as one can be



made in less than a minute, they can be left about the run, say at the gates of the paddocks. All that is necessary is an ordinary fork stick with a hole large enough to pass a wire through at A. If the break occur in a part of the wire away from the straining post, as it almost always does, one end of the wire, which we will call B, is bent back, and an eye made in it as in the figure. Then the other end of the wire (C) is passed through the eye or loop in B, then it is

pushed through the hole A in the butt of the forked stick. After this has been done the forked stick is turned round and round by prongs D and E. These latter give great leverage, and it will be found that the wire is soon strained to sufficient tightness. When the fork has been revolved the required number of times, it is quickly moved on to wire C, so that this wire is doubled back on itself. The angle thus formed will be found to hold both together until C is fastened. Care should be taken to avoid making a twist in wire B, for, if C does not run smoothly through the eye in B, considerably more force will be necessary. A fresh bit of wire has generally to be added to C to allow of its being brought up to B in the first case, and the joining should be put so far back as to avoid catching in the eye in B when straining.—*Australian Pastoralists' Review*.

TO PREVENT HORSES FROM BOLTING.

An ingenious Frenchman, Mr. Ranglaret, claims to have invented an infallible means for stopping short a bolting horse. Inside of the two ordinary winkers he fixes a pair of mobile false winkers, connected with each other by means of a string. That string passes through a ring in the hames, and is held in the hand of the driver. Should the horse bolt, the driver pulls slightly the string, the false winkers close like a pair of eyelids, and the horse being quite blinded stops at once. It is claimed that experiments carried on in the presence of the Minister of War have been successful, and proved the perfect efficacy of Mr. Ranglaret's device.

A FLY TRAP.

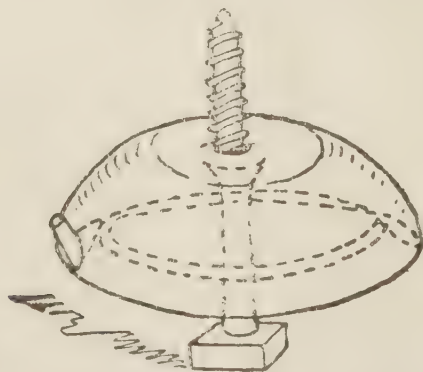
Fill a tumbler half-full of water in which soap has been dissolved. Now cut a slice of bread about 1 inch thick which will completely shut the mouth of the glass. In the centre of the bread make a funnel-shaped orifice and spread something sugary, like honey, on the side of the bread facing the soapy water. The flies will walk down the funnel and quickly be asphyxiated. Several glasses can be placed in the kitchen; when flies are numerous, fill them in the evening and morning.

TO CALCULATE THE WEIGHT OF A GREEN CROP.

The weight of a crop of cow pea, velvet bean, &c., may be approximately ascertained by multiplying the weight on a square yard by 2.61. The result will give the weight per acre in tons. An example is given on page 50 of this number of the *Journal*, under the heading of "Green Manures."

AN ANT PUZZLER.

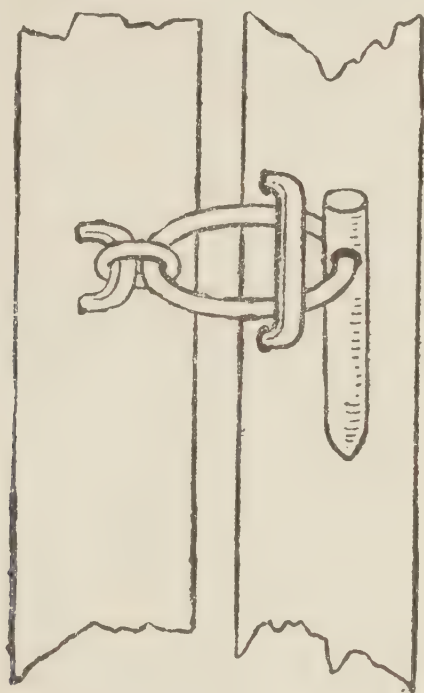
From the *Australasian* we take the accompanying sketch of a contrivance which is properly named "the ant puzzler." This device, intended to be screwed to the legs of meat-safes, hive-stands, &c., patented in Adelaide, by the late Mr. Heath, should prove extremely useful in those localities where ants abound.



It has a flange underneath for holding kerosene, which is indicated by the dotted lines. As kerosene is an effectual bar to the progress of all ants, anything protected by this puzzler should be perfectly safe. Our sketch is from the *Journal of Agriculture and Industry*, South Australia.

AN EFFECTIVE GATE-FASTENER.

The gate-fastener, shown in our sketch, is one frequently seen on the farms in the neighbourhood of Gawler, South Australia. It is preferred to all other, as no farm animal can open it, and even workmen who see it for the first time find a difficulty in opening and fastening it. It is, however, extremely simple, and consists of a staple on the gate and one on the post. To the latter staple is attached a small chain consisting of two links—one of small size, the other



$3\frac{1}{2}$ inches long. On this long link runs freely a rod of iron about $3\frac{1}{2}$ inches long. This rod is perforated about 1 inch from the end, which causes it to hang perpendicularly when the gate is fastened. To open the gate the rod is brought into a horizontal position, and drawn through the gate staple. To fasten the gate, the long end of the rod is first passed through the staple, and as soon as the end of the long link is through the rod is allowed to hang, and the fastening is complete.—*Australasian*.

CATFISH AS SALMON.

A petition has been presented to the police jury of Concordia, in the State of Louisiana, requesting the privilege of fishing in the waters of the parish for spoon-bill catfish, with the object of canning them and passing them off as salmon.

RATION FOR HORSES ON BOARD SHIP.

The regular ration for a horse on a sea voyage should consist of 5 lb. oats, 5 lb. bran, 10 lb. (about 3 cubic feet) hay, 8 lb. straw, $\frac{1}{2}$ -gill vinegar, $\frac{1}{2}$ -oz. nitre, and 8 gallons water.

A horse drinks $1\frac{1}{2}$ gallons at a time, and takes usually three minutes to drink.

HOW TO SET A MOUSE-TRAP.

After setting a mouse-trap place it in a paper bag, and you will find it a sure way of trapping these little pests.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Agricultural Patents.

APPLICATIONS ACCEPTED.

Patent Office, Brisbane, 21st November, 1900.

The undermentioned applications for Patents have been accepted at the Queensland Patent Office:—

STRIPPING COMBS.—Application No. 5347: Michael Hogan, of South Bundajong, near Yarrawonga, Victoria, farmer: "Improvements in or connected with the Teeth of Combs for Strippers or Harvesters." Dated 15th January, 1900. (Drawings, 7s. 6d.; specification, 4s. 6d.) The place of greatest wear is formed with an original recess into which a removable or renewable steel plate is fitted and attached by screws, &c.

WIRE-STRAINING TWITCH.—Application No. 5391: Francis Woodhouse Hopkins, of Culpaulin Station, Wilcannia, New South Wales, grazier. "Improved Wire-straining Appliance." Dated 22nd February, 1900. (Drawings, 5s.; specification, 3s. 6d.) A round iron rod has a close crank formed at one end and a flattened hook at the other. The cranked part is applied over the slack wire, which is wound tight round the crank, and the hooked end is then engaged with the wire to prevent unwinding. The appliance is left in position on the wire.

VERMIN FUMIGATOR.—Application No. 5522: William Lefevre Cranstone, of 11 Victoria street, Melbourne, Victoria, medical practitioner. "An Improved Fumigating Machine." Dated 2nd June, 1900. (Drawings, 5s.; specification, 5s.) A cylindrical case has two perforated shelves, the perforations being conical and pressed above the shelf surface. The upper one supports the burning sulphur composition, and the lower one catches waste, &c. An inverted funnel closely filling the top is connected to a rubber tube to lead the fumes to the rat hole or other place to be fumigated.

BRANDING BY VACUUM MACHINE.—Application No. 5526: John Wright, farmer, and John William Mitchell, machinist, both of 2 Commercial Chambers, Manse street, Dunedin, New Zealand. "Improved Apparatus for Branding and Tatooing." Dated 5th June, 1900. (Drawings, 5s.; specification, 3s. 6d.) A stencil of the brand forms one side of a vacuum chamber on a suitable handle, with two-way taps and flexible conductors to the air-pumps, &c. The brand is applied while the article is in a soft state, and the vacuum is maintained until the carcass or article hardens. With live animals a pigment composition is rubbed in the inflamed surface caused by continued suction, to produce a permanent tattoo.

WIRE-STRAINING TWITCH.—Application No. 5543: Henry Arthur Wilson, of 29 Bligh street, Sydney, New South Wales, clerk. "An Improved Wire-strainer." Dated 15th June, 1900. (Drawings, 15s.; specification, 5s.) A cast metal twitch piece has a central roller, with two short engaging claws at one end, and two longer locking claws at the other. A hole is drilled in the barrel for engaging the ends of broken wires. A detachable handle winds the appliance, which is left in position on the wire.

ADVERTISING REWARD LABELS FOR ANIMALS.—Application No. 5544: Arthur John Webb, Yarra Glen road, Healesville, Victoria, grocer. "An Improved Identification or Information-conveying Label." Dated 15th June, 1900. (Drawings, 10s.; specification, 7s.) A flat waterproof metal case,

attachable to the neck of a straying animal, contains a removable metal label, with a clip for postcard or the like; also money may be enclosed in the compartment. Directions to use the postcard or money to advise the owner of the animal, or other appropriate announcement, may be written or printed on the cover and label.

PNEUMATIC ROTARY CHURNS.—Application No. 5547: Thomas Francis Tierney, of No. 74 Cortlandt street, city of New York, State of New York, United States of America, manufacturer of churns. "Improvements in Rotary Churns." Dated 18th June, 1900. (Drawings, 17s. 6d.; specification, 8s.) A tub-churn has fixed inclined guide-plates or vanes, and a central centrifugal stirrer with tubular axis, down which air is sucked by the rotating stirring vanes in the enlarged disc-foot.

REAMER-TOOL FOR WELL-BORING.—Application No. 5380: Alexander George Percy Creed, of 169 Phillip street, Sydney, New South Wales, mechanical engineer. "An Improved Bit and Rimmer for Artesian Well-boring or other Drilling." Dated 16th February, 1900. (Drawings, 3s. 6d.; specification, 4s.) The spreading cutters are at the lower ends of a heavy spring fork, which will enter the casing when compressed, and open out on release below its foot. In a plane at right angles are a pair of crossed and bowed springs of lighter make, the feet of which on release below the casing spring out and block the cutters at full width. On lifting the tool into the casing, the bowed springs make first contact with the casing foot, and release the main cutters, allowing them to be compressed and to enter the casing.

SUSPENDED HUB FOR VEHICLES.—Application No. 5628: Marion Milton Bailey, of 390 South Fountaine Avenue, Springfield, county of Clark, State of Ohio, U.S.A., journalist. "Improvements in Vehicle Wheels." Dated 14th August, 1900. (Drawings, 17s. 6d.; specification, 13s. 6d.) The hub is duplex, the portion attached to the axle sliding between flanges on a frame to which the spider-spokes are attached in tension as usual. Between saddles or bridge pieces on the two portions of the hub is a pneumatic annular cushion, taking bearing against bridges on alternately the inner and the outer portion of the hub. A duplex flexible cord is also laced around the cushion to alternate portions of the duplex hub, and it is claimed that the arrangement is such that the resulting excentric displacement of the axis under the load assists propulsion uphill and retards it downhill.

The Markets.

AVERAGE TOP PRICES FOR NOVEMBER.

Article.								NOVEMBER.		
								Top Prices.		
								£	s.	d.
Bacon	...	...	...	...	...	...	lb.	0	0	7 ¹ / ₈
Bran	...	...	...	...	...	...	ton	5	18	9
Butter, First	...	...	...	...	...	...	lb.	0	0	11 ³ / ₈
Butter, Second	...	...	...	...	...	...	,,	0	0	8 ¹ / ₂
Chaff, Mixed	...	...	...	...	...	...	ton	3	15	0
Chaff, Oaten	..	...	...	...	...	...	,,	4	8	9
Chaff, Lucerne	...	...	...	...	...	...	,,	5	0	0
Chaff, Wheaten	...	...	...	...	...	...	,,	2	15	0
Cheese	...	...	...	...	...	...	lb.	0	0	7
Flour	...	...	...	...	...	...	ton	8	10	0
Hay, Oaten	...	...	...	...	...	...	,,	3	12	6
Hay, Lucerne	...	...	...	...	...	...	,,	3	16	10 ¹ / ₂
Honey	...	...	...	...	...	...	lb.	0	0	1 ⁵ / ₈
Rice, Japan (Bond)	...	...	...	...	...	...	ton	15	8	9
Maize	...	...	...	...	...	...	bush.	0	3	10 ⁷ / ₈
Oats	...	...	...	...	...	...	,,	0	3	3 ³ / ₄
Pollard	...	...	...	...	...	...	ton	5	18	9
Potatoes	...	...	...	...	...	...	,,	7	12	6
Potatoes, Sweet	...	...	...	...	...	...	,,	2	11	3
Pumpkins	...	...	...	...	...	...	,,	2	3	9
Sugar, White	...	...	...	...	...	...	,,	16	10	0
Sugar, Yellow	...	...	...	...	...	...	,,	13	0	0
Sugar, Ration	...	...	...	...	...	...	,,	10	10	0
Wheat	...	...	...	...	...	...	bush.	0	3	5
Onions	...	...	...	...	...	...	cwt.	0	10	7 ¹ / ₂
Hams	...	...	...	...	...	...	lb.	0	0	9 ⁵ / ₈
Eggs	...	...	...	...	...	...	doz.	0	0	10
Fowls	...	...	...	...	...	...	pair	0	4	3
Geese	...	...	...	...	...	...	,,	0	6	6
Ducks, English	...	...	...	...	...	...	,,	0	4	6 ³ / ₄
Ducks, Muscovy	...	...	...	...	...	...	,,	0	6	3 ³ / ₄
Turkeys, Hens	...	...	...	...	...	...	,,	0	7	6
Turkeys, Gobblers	...	...	...	...	...	...	,,	0	15	0

ENOGGERA SALES.

Article.								NOVEMBER.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	10	3	0
Cows	...	...	...	...	...	...	...	7	7	3
Wethers, Merino	...	...	...	...	...	...	...	0	15	7
Ewes, Merino	...	...	...	...	...	...	...	0	9	4 ¹ / ₂
Wethers, C.B.	...	...	...	...	...	...	...	0	15	8 ¹ / ₂
Ewes, C.B.	...	...	...	...	...	...	...	0	12	6
Lambs	...	...	...	...	...	...	...	0	13	6 ³ / ₄
Baconers	...	...	...	...	...	...	...	1	18	1 ¹ / ₂
Porkers	...	...	...	...	...	...	...	1	3	11
Slips	...	...	...	...	...	...	...	0	8	3 ³ / ₄

Farm and Garden Notes for February.

Farm.—During this month the land should be got ready for the potato crop. It should be deeply ploughed and got to a fine tilth. Plant small potatoes whole. Large ones would have to be cut, and the setts would probably rot. The weather will be still hot and muggy, and weeds will be troublesome. It is advisable in that case to defer the sowing of lucerne until they are quite got rid of. Lucerne should be sown in rich, deep soil, thoroughly and deeply ploughed and worked. Look over the seed potatoes, and, if they are becoming wormy owing to dry weather, they had better be planted at once. Panicum, Cape barley, sorghum, vetches, Kafir corn, and imphee may be sown under the above conditions. Some sow maize for a late crop, but this is always risky, as, if early frosts should occur, the ripening crop is in danger of being ruined. Sow swede turnips and mangold wurtzels for an early winter crop.

Kitchen Garden.—Preparation should now be made for the main autumn and winter crop, by ploughing up all unoccupied land. Let it remain in the rough state to get the benefit of exposure to the air, only harrowing or raking each section as it is required. In poor soils use plenty of well-rotted manure. Chicken guano prepared in the manner described in this number of the *Journal* will give good results. Those who have already got cabbages and cauliflowers ready for transplanting should put them out now. We believe, however, that it is better to defer the sowing of cabbages and cauliflowers till March, as the fly is usually troublesome during February. Still, as it is always advisable to get early vegetables, these, as well as the various varieties of French beans, carrot, turnip, beet, radish, peas, lettuce, onions, leeks, &c., may be sown. Swedes may be largely sown. Cucumbers, melons, and marrows will be in full bearing, and will require little attention beyond gathering the fruit. Whether required for use or not, it should never be allowed to ripen on the vines, as the latter will then soon cease to be productive. Of course, if seed is required, some fruit may be left to ripen. Should the weather prove dry, give all plants a thorough soaking.

Flower Garden.—Many amateur gardeners will now be asking what annuals they shall sow in order to have the garden looking gay and blooming in the coming cool weather. The answer to this question was given most exhaustively in the corresponding month of 1900, by the Curator of the Brisbane Botanic Gardens, Mr. P. Mac Mahon. There the inquirer will find a list of 174 named varieties of flowering plants, in most cases with their familiar English as well as their scientific names. The following may be selected, and will yield a variety for the most exacting of gardeners in Queensland:—Amaranthus, antirrhinum, aster, balsam, calliopsis (*Coreopsis*), campanula, carnation, centaurea, cockscomb, convolvulus, chrysanthemum, dianthus, pansy, sweet pea, phlox, poppy, portulaca, sweet William, zinnia, mignonette, nasturtium, larkspur, stocks, &c. Treat the land liberally with manure, and dig it in. Keep the weeds down; do not let them seed. Keep planting out palms. It is well to give temporary shade during the scorching spells between rainy and muggy days to tropical evergreens. You can bud all sorts of plants now, such as roses, &c. You can also layer great numbers of different plants which do best in this way. Geraniums strike readily from cuttings now, and, if put in where they are intended to remain, will give very little after-trouble. Tie up dahlias and loosen the ties on plants which may suffer from the bands being too light.

In sowing seeds, to avoid sowing too deep, a good plan is to cover them with fine soil to the same depth that the seed is in size. For instance, a sweet pea is about an eighth of an inch in diameter. Cover it with an eighth of an inch of soil.

Orchard Notes for January.

By ALBERT H. BENSON.

In bearing deciduous orchards, the chief work of the month will be the gathering and marketing of the fruit. This work requires to be carried out in a much better and more systematic manner than is usually the case, as a great deal of our fruit is badly handled, badly graded and packed, and is sent to market in a very unattractive manner. Good fruit always pays for careful handling and neat packing. Use clean new cases, grade the fruit for quality and size, and carefully examine it for fruit fly, scale insects, or codlin moth. All infected fruit should be destroyed by boiling, and be then fed to pigs or poultry, as its presence in the case is apt to condemn the whole when same is examined by the inspectors under the Diseases in Plants Act.

When codlin moth is present, the bandages should be examined every week, and all larvæ found therein destroyed, and all moth-infested fruit should be gathered and destroyed. If this method of treatment is carefully carried out throughout the season, there will be no great difficulty in keeping this pest in check, as it is not generally established, but is practically confined to the Stanthorpe district and two or three other parts of the Downs.

The fruit fly must be systematically fought by gathering and destroying all infected fruit. This is of especial importance in the Stanthorpe district, where it will do considerable injury to the later fruits unless every effort is made to stamp it out as soon as it makes its appearance. Fruit imported into this district from other parts of the colony should be carefully examined, and, if found infected, should be at once destroyed, as there is no surer way of giving this pest a good start than by the introduction of infected fruit.

Young deciduous trees should receive their summer pruning where necessary. This pruning consists in the shortening back of long straggling growth, and the thinning out of superfluous wood. Its object is to keep the trees strong and symmetrical, and cause the development of fruit spurs along the main branches. The manner in which the pruning is carried out and the result of such treatment in the past can be noted by a visit to the State orchards at Hermitage or Westbrook. Such a visit will well repay any fruit-grower the trouble and expense of the journey to these farms, and will show better than any writing how the work should be carried out.

The budding of deciduous trees can be done now, the only elements necessary to success being that the bark runs freely, that the buds are plump and well developed, and are tied firmly into their places.

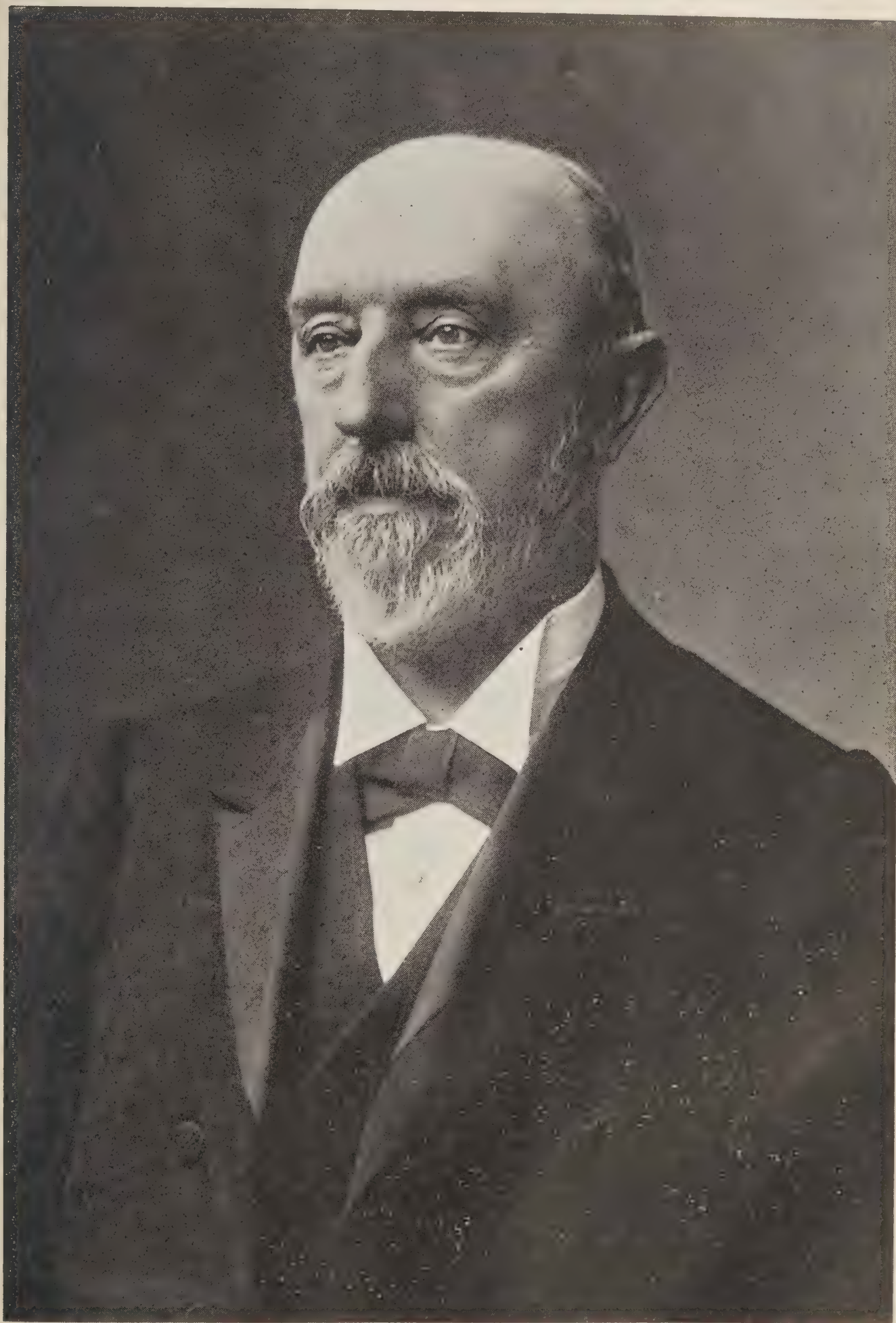
In the coastal districts the planting of pines and bananas may be continued if desired, but earlier planting is preferable, especially in the Southern parts of the colony. Tropical fruits, such as mangoes, should be planted during the month, choosing dull moist days for the purpose. Mangoes can also be budded or grafted either by the method of plate budding described by Mr. Knight in the July number of the *Journal*, Vol. VII., p. 41, and Vol. VII., p. 256 (September), or by means of the saddle graft as described in the January number of the *Journal* for 1899.

All citrus fruits can also be budded, taking care to use plump, well-developed buds, and to see that the bark runs freely.

All young trees in the nursery should be kept well cultivated and free from weeds. They should be trained to a single stem, and staked where necessary. Seedling citrus stalks can be set out in the nursery row during seasonable weather.

There is usually a heavy growth of weeds and summer grass in the orchard during the month, so that every opportunity should be taken to keep them in check by means of the harrow or cultivator during dry weather, as, if this is neglected, they are apt to get out of hand during a wet spell. In the drier parts of the colony the orchard should be kept well cultivated, and, where water is available for irrigation, citrus trees should receive a good soaking during the month, taking care to give the land a thorough cultivation as soon after the irrigation as it will stand working, as this tends to prevent the formation of a crust and to retain the moisture in the soil. In the Southern coastal districts mangoes and the main crop of pines will be ripening towards the end of the month, so that in the case of the former every precaution should be taken to prevent their destruction by fruit fly by the gathering and boiling of all fly-infected fruit of all kinds. The destruction of scale insects should be continued by either spraying or cyaniding; and where leaf-eating insects are troublesome, the same can easily be kept in check by spraying with arsenical washes, as recommended in the October number of the *Journal* for 1900.

Where it is proposed to plant orchards on new scrub land this is a good time to fell the scrub, letting it lie till late in the autumn or early winter, when it can be burnt off during dry bright weather. The clearing of forest land can also be continued, the land as stumped being sown with corn preparatory to its being planted with trees the following winter, as the working that the corn receives is a good preparation of the land for fruit.



From Photo. by Poul C. Poulsen.

THE LATE HON. SIR JAMES ROBERT DICKSON, K.C.M.G.,
Minister for Defence in the Federal Cabinet; M.L.A. for Bulimba; Chief Secretary for Queensland.

SIR JAMES R. DICKSON, K.C.M.G.

When the news was received of the death of Sir James R. Dickson, universal regret was expressed by the whole community. The best and noblest of men have their enemies, and the late statesman was no exception to the rule; but friends and enemies alike were inexpressively grieved to hear of the death of one who had been for such a long series of years connected with the political life of Queensland. In the various offices he has held in this State, he always brought to bear upon his work untiring energy, acute intellect, and business acumen, and in no case were these qualities more brilliantly conspicuous than in the part he took in the Federation campaign. That he should have been cut off just as he had attained the goal to which his eminent services had led him, was a source of deep regret to all who had come to regard him as a patriot and a statesman, who looked upon him as a man to be trusted and respected, and who felt that by his death an almost national loss had been experienced. The deceased statesman was born at Plymouth (Eng.) on the 30th November, 1832, and had therefore just entered his 69th year. He was not long at Plymouth, however, he removing with his family to Glasgow, where he was put to the High School. Presently he secured a junior clerkship in the City of Glasgow Bank—long, however, before that institution fell on evil days—and this may be said to have been the beginning of his busy business life. He did not remain long, however, in the Old World. Attracted by the newer and broader life across the seas, he set out for Victoria in 1854, and there became connected with banking and commercial interests. From here he drifted to New South Wales, where he entered into partnership with some relatives there in a big way of business. But he felt he must strike out for himself, and chose Queensland shortly after its erection into a separate colony. He landed here in 1862, and entered into business as an auctioneer, which he followed for many years. He retired from business in 1889 in favour of his son and partner, who continued the old firm.

In 1873 he entered Parliament as the representative of Enoggera, and represented that electorate up to May, 1888. In May, 1876, he accepted office as Secretary for Public Works and Mines, as a member of the Macalister Government; and in the same year, when the Liberal party was reorganised under Mr. George Thorn, he was appointed Colonial Treasurer, which office he held under the Premiership of the Hon. John Douglas, and subsequently of Sir S. W. Griffith, then Mr. Griffith, until the resignation of the Ministry in 1879.

Sir James Dickson led the Opposition in the Assembly during the absence in England of Mr. Griffith during part of 1881; and on the formation of the Griffith Government, in 1883, he took the office of Colonial Treasurer, which had been kept open for him during the trip he made to the old country, whither he went at the beginning of

1883. In 1887, during the absence of the Premier (Sir S. W. Griffith), who attended the conference of colonial representatives in London, Sir James Dickson performed the duties of Acting Premier. He was one of the representatives of Queensland at the two first sessions of the Federal Council held in Hobart in January and February, 1886 and 1887. He resigned his position as Colonial Treasurer in August, 1887, on account of disagreeing with his colleagues over land administration and proposed land tax, and to test the feeling of his constituents on his action he resigned his seat, but was re-elected by a large majority.

At the general elections in 1888, he was defeated for Toombul (which was a portion of the original Enoggera electorate, then for the first time constituted a separate electoral district), through a small minority, and in 1889 proceeded to Europe, where he remained for over two years, residing in Great Britain, France, Holland, Belgium, Germany, Italy, and Greece. On his return to Queensland in 1892 he directed public attention to the necessity of resuming the introduction of coloured labour for tropical agriculture, and his views were followed by the appearance of the celebrated Government manifesto of 1892. In April, 1892, he offered himself for the representation of Bulimba to test public feeling on his published opinions, and after an exciting contest was elected by a large majority. He was continuously a member of the Liberal party in politics.

Sir James was connected with several large financial institutions in Queensland, being formerly chairman of the Royal Bank of Queensland, and at his death of the Brisbane Permanent Building and Banking Company, the Queensland Trustees, and the Queensland Investment Company. He was justice of the peace for Victoria, and a Fellow of the Royal Geographical Society of Great Britain, and of the Royal Colonial and Imperial Institutes, London. He was also a member of the Victoria Bridge Board, which body was appointed under an Act of Parliament in 1893 to provide for the construction, control, and payment of cost of the new Victoria Bridge across the Brisbane River, connecting North and South Brisbane. At the general elections in 1893 and 1896 he was again returned for Bulimba. In 1896 Sir James was again appointed as one of the Queensland representatives to the Federal Council of Australasia, which sat in Hobart in that year; and in February, 1897, he accepted the portfolio of Secretary for Railways, offered him by the Premier, Sir Hugh Nelson, to which was subsequently added the office of Postmaster-General.

On the occasion of the Diamond Jubilee (June, 1897), Sir James Dickson was honoured by Her Majesty with the decoration of Companionship of SS. Michael and George. In March, 1898, he accepted the office of Home Secretary in succession to Sir Horace Tozer, who proceeded to England as Agent-General. Sir James, as representative for Queensland, attended the Postal Conference held in Hobart immediately thereafter, and on his return to Queensland was requested by Mr. Byrnes, who had just succeeded Sir Hugh

Nelson as Premier, to continue to administer the Home Secretary's Department in the new Government. During Mr. Byrnes's extended visits to the different districts of the colony, which he performed on his assumption of the Premiership, Sir James discharged the administrative duties of Chief Secretary in addition to his own portfolio of Home Secretary. At one time, while his colleagues were also absent on provincial tours, he administered simultaneously the office of Chief Secretary, Home Secretary, Minister for Railways, Treasurer, and Postmaster-General. On the lamentably early death of Mr. Byrnes, in September, 1898, Sir James was summoned by the Crown to conduct the administration of the colony, and was accordingly sworn in as Vice-President of the Executive Council and Chief Secretary (Premier) of the colony on 1st October, 1898. During his term of office as Premier, Sir James Dickson led the Federation campaign in Queensland, and his capacity for work was never so well exhibited as on that occasion. While Premier also, Sir James made the first offer of colonial troops for service in South Africa, and that offer was conditionally accepted some time before the war began. As Sir James Dickson secured the small majority of one upon a motion for adjournment of the debate upon the Railway Standing Committee Bill, introduced by him, he deemed it obligatory on him to resign office, which he did on 29th November, 1899, being succeeded by Mr. Dawson's short-lived Labour Ministry; but on Mr. Philp's taking over the reins of government (7th December, 1899), Sir James was reappointed Vice-President of the Executive Council and Chief Secretary of the colony. Sir James was appointed representative of Queensland on the federal delegation to the Imperial authorities in connection with the Commonwealth Bill, and he accordingly left for England on 4th February, 1900.

On Sir William Lyne failing to form a Federal Ministry and Mr. Barton being sent for, the latter gentleman did the deceased gentleman the honour of including him in the first Cabinet, allotting him the important department of Defence. Simultaneously with this Her Majesty knighted him, with the Order of St. Michael and St. George.

Our photograph in this issue has been reproduced from a special negative taken by Mr. Poul C. Poulsen, Queen street, Brisbane.

Agriculture.

FIELD AND GARDEN REMINDER FOR FEBRUARY.

BY HENRY A. TARDENT,
Manager, Biggenden Experiment Farm.

All over this State of Queensland, February is usually the wettest month of the year. Not seldom floods are then the troubles with farmers, especially with those who have their farms on the fertile alluvial lands bordering our rivers and creeks. It is no doubt a great advantage in many respects to have the homestead near the water. Still people would do well to follow the example of many farmers of my acquaintance who have removed the farm buildings from the river bank to the higher knolls usually existing not far off across one or two billabongs.

Crops should be without delay removed from all fields likely to be flooded and carefully stored in rainproof sheds or stacks.

The precautions indicated last month should be taken to prevent any erosion and washing away of valuable soil.

Where there is good drainage and no strong currents exist, those periodical floods with so-called backwaters are extremely beneficial to the land. They soak it thoroughly, and leave on the surface a thin layer of slime which is probably the most perfect manure in existence.

Where circumstances are favourable, I have no hesitation in recommending the damming of creeks and gullies so as to cause the flooding of the adjacent land, and give it the benefit of an automatic manuring, equivalent in its effects to the fertile deposits of the River Nile in Egypt.

It is now too late for corn, sorghum, and millets—except, perhaps, setaria—unless they are intended for feeding green or for ensilage.

But as soon as the heavy rains are over and the state of the land will permit, a start can be made in many places with potato planting.

Experience teaches that for this crop it is not advisable to divide the tubers into cut sets. Both the soil and the atmosphere are hot and moist. Such conditions are favourable to the life and development of the microbes of decay. The cut surfaces of the potato are for them an admirable feeding and breeding ground. In a very short time the cut sets will have disappeared under their destructive action.

The best results are usually obtained from sound, well-shaped, medium-sized tubers, planted just when they begin to bud. The drawback of such sets is that not seldom the plant grows *bushy* with as many stems as there are buds with potatoes. But we have to put up with that until one of us discovers a practical method of blinding all the eyes except one or two.

The distance at which to plant depends on both the nature of the soil and the kind of potato. Two feet six inches between the rows, and from 8 to 10 inches in the rows are fair averages. A little—very little—less for the quick-growing small-stemmed varieties; a little more, up to 3 feet by 1 foot, for the Blueskins and other varieties with bushy stems and a spreading system of roots.

Where the land is well drained, and there is no danger of the water forming gullies along the drills, it is a good plan to put the sets at the bottom of deep drills opened with the plough, and to cover them slightly—2 or 3 inches—with light short-teeth harrows drawn along, not across, the drills. One or two more harrowings and as many scarifyings as the plant grows will keep the land clean and loose, and bring enough soil towards the plants to fill in the drill. Thus the potatoes will be practically hilled up, but the land will be flat or nearly flat.

I confidently recommend such a plan to those who grow potatoes in dry districts where drought is the enemy to be faced.

Where drainage is defective, or in districts with a superabundance of moisture, one must follow the old system of hilling up with the plough which has been evolved to suit the circumstances and the humid climate of Europe and the British Islands.

Potatoes can stand a good deal of moisture, provided it is not the result of stagnant water, which infallibly causes the decay of the tubers and consequent loss of crop. Hence the best results are obtained with the crop on rich, deep, loose, and well-drained sandy loams and scrub land. On more sticky forest land, the soil must be made porous and permeable by an abundant application of straw and stable manure, &c.

Anyone anxious to raise a good potato crop should carefully peruse the invaluable article on the subject published in the November number of the *Journal* by our old friend, Mr. R. J. Martin, of Highfields, a gentleman who stands second to very few men in this State in all that pertains to potatoes and the care they require.

During the whole of the month successive sowings can be made of lettuces, radishes, cabbages, and cauliflowers. Do not forget to spread over the beds a thin—very thin—layer of fresh horse manure. The subsequent waterings will take from it and carry to the roots substances beneficial to the plants. But its greatest advantage lies in the pungent ammoniacal smell it evolves, which keeps off the little flies and other insects so destructive to the young delicate plants.

The Improved St. John, the Early and Large York (pear-shaped), the Common Ball, &c., are amongst the surest croppers; Successive and Marble-heart Drumheads are somewhat coarser, but extremely profitable.

In cauliflowers, I have always obtained my best results from the Large Asiatic. Other varieties gave also fine heads, but they require constant watering.

Transplanting should be done towards the evening and, whenever possible, on a cloudy day. The sun is now very trying to young plants; and should the weather clear up, it is advisable to protect for a few days the young plants with paper, bark, leaves, bushes, &c., until they have time to thoroughly recover and emit a new set of roots.

Sow also quick-growing marrow, such as the custard, and cucumbers, swedes, beets, beetroots, a few carrots, French beans, peas, and other autumn and winter vegetables, including the hardy New Zealand spinach. Poultry farmers should sow without delay Japanese buckwheat, sunflowers, and some yellow millet for the chickens.

This is also a very good time to sow, and especially to multiply from roots, the coming grass, *Paspalum dilatatum*, to which every farmer of the State should give a trial on a small scale. This farm has a few rooted plants left for distribution.

This month is a troublesome one for weeds. Fields, apparently perfectly clean, are in a few days invaded by all sorts of noxious plants. Should the wet weather continue, they grow with incredible rapidity, cover the whole field, and infest it with their seeds. Every opportunity should be seized to knock such enemies on the head—or, rather, to pull them up by the roots—before they have time to shed their seeds, and leave behind them the germs of their nefarious progeniture.

AN IMPERIAL TARIFF.

We have received from the United Planters' Association of Southern India copy of a letter which has been circulated throughout the British Empire to a large number of chambers of commerce and other bodies concerned with trade in British communities. The letter has also been addressed to a large section of the Press, with the expressed hope that the action of the association will

be favourably viewed in order that a very important subject may be thus brought under discussion. The following resolution, which is the *raison d'être* of the circular letter we refer to, contains a principle which, so far as we know, has not been very ardently taken up in Great Britain, although it has frequently been discussed. It reads thus:—

“That, considering the critical condition of the tea and coffee industries, this association do communicate with the Indian Tea Association, the Ceylon Planters' Association, the Indian Chambers of Commerce, and the leading firms of merchants and brokers interested in tea and coffee, &c., in this country and in England and her colonies, with a view to ascertaining whether a movement in favour of a commercial combination of Great Britain and her colonies and India against the world (which would, by a system of differential duties, afford some protection to British-grown products and manufactures) would receive support.”

This resolution may be said to have resulted chiefly from the recent revision of the French tariff in regard to imports of produce from (*inter alia*) India and the British colonies and dependencies.

The French Parliament, as an act of reprisal against Brazil, recently voted a law doubling the duties on coffee, tea, and spices imported from countries not having treaties of commerce with France or not enjoying most-favoured-nation treatment, among which are India and the British colonies and dependencies (with the exception of Canada).

The French and Brazilians have made up their quarrel, but the French tariff law, which was really directed against Brazil, still subsists. There appears to be reasonable ground for hope that it will not be put into force, but, if it should, the consequence would be—to use the words of the “Economist”—that the prohibitory tariff for colonial produce would only be applied to countries, British colonies among others, for which it was not intended.

Although it is possible that the French Government may be induced to reconsider the action referred to, yet what has been already done serves as an unmistakable warning of the grave risk to which British trade is at present exposed, and the burdens it may at any time be called upon to bear.

It is felt that there is a strong and growing feeling in England and her dependencies and colonies in favour of what may be termed an Imperial Fiscal Federation for the protection of British interests as against those of the rest of the world.

The principle enunciated in the above circular appears to us to involve the question of Freetrade *versus* Protection. Clearly it would be quite beyond the province of this *Journal* to devote space to this intricate subject. We may, however, state that at the annual meeting of the Association of Chambers of Commerce of the United Kingdom held at Paris in September, 1900, it was pointed out by the vice-president of the British Chamber in Paris that the French Government had established two tariffs of duties: one, the *tarif minimum*, applicable to goods from countries enjoying most-favoured-nation treatment; the other, called the *tarif général*, applicable to goods from other countries. For certain articles, only one tariff was made, *tarif général*—all countries being treated alike. Some time ago, a difficulty arose with Brazil, which was the largest supplier of coffee to France. The Brazilian Government considered that the duty of 156 francs per 100 kilos (£6 10s. per 220 lb.), or 121 per cent. of its value, was too high, and requested the French Government to reduce it, which it refused to do. Whereupon Brazil threatened to discriminate against France by putting a heavy duty on French goods. To that, France replied by passing in the Chambers a law increasing the *tarif général* to almost double its previous rates, not only for coffee, but for chocolate, pepper, spice, nutmegs, mace, cloves, vanilla, and tea (very few of which articles were imported from Brazil), and making the previous *tarif général* into a minimum tariff, so that countries not having favoured-nation treatment—into which category come the British colonies—would have to pay the new *tarif général* rates.

As has been already pointed out, since that date Brazil has come to terms with France, and obtained favoured-nation treatment, as well as a reduction of duty on coffee from 156 francs to 136 francs (law of 17th July, 1900). Brazil had thus won her battle with the curious result that all other countries not having favoured-nation treatment had to pay nearly double duty. In August a decree was signed by President Loubet authorising the application of the minimum tariff to such products from certain countries, including British colonies, possessions, and protectorates until 31st December, 1900, reserving the right to apply the minimum tariff for two years from the promulgation of this law (24th February, 1900). If this were not done, however, the general tariff would be applied on and after 1st January, 1901; and even if the present concession were extended to the full limit authorised by the law—i.e., to 25th February, 1902—the *tarif général* would then be applied.

The result would be that the following products of British colonies would have to pay the following duties on entering France:—

					Per 100 kilos (220 lb.)	
					General Tariff.	Minimum.
					Fr.	Fr.
Coffee (beans)	...	...	...	...	300	instead of 136
Do. (roasted or ground) ...	...	...	...	...	400	„ 156
Chocolate (over 55 p.c. cocoa) ...	...	...	...	...	300	„ 150
Do. (less than „) ...	...	...	...	...	200	„ 102.25
Pepper	...	...	...	...	400	„ 208
Allspice, pimento, amomums, cardamoms, cinnamon, <i>Cas-</i> <i>sia lignæ</i>	...	...	...	...	400	„ 208
Nutmegs (in shells)	...	...	...	...	400	„ 208
Do. (shelled)	...	...	...	...	600	„ 312
Mace	...	...	...	...	600	„ 312
Cloves	...	...	...	...	400	„ 208
Vanilla	...	...	...	...	800	„ 416
Tea	...	...	...	...	400	„ 208

These were the circumstances which induced the Chamber of Commerce (Paris) to take action in the matter, and which have led to the present action of the United Planters' Association of Southern India.

On 19th October, 1900, the *Home and Colonial Mail* published the following statement received from Havre on 15th October:—

COFFEE IMPORT DUTIES IN FRANCE.

According to information obtained here, it is not correct, as reported from Bombay, that Indian coffee exported to France will in future have to pay double the duty levied upon Brazilian coffee. Coffee grown in British possessions will, on the contrary, continue to enjoy the benefit of the French minimum tariff indefinitely. Venezuelan coffee is the only coffee affected, as France has no commercial treaty with Venezuela, and the duty on coffee from that country will therefore be double what it is on other kinds. The duty fixed on Venezuelan coffee was at first to be applied to all coffee coming from Venezuela after 21st September; but since this decision was taken, and in consideration of the protests made by the different Chambers of Commerce, this date has been extended until 31st December. Meanwhile, a treaty is likely to be concluded with Venezuela, and then the import duty on coffee will be the same for all.

Now, seeing that Canada was discriminating against France by giving a preferential tariff to England, what effect would the resolution have upon her? Would the trade of the Dominion be penalised because the chamber had attempted to give preferential treatment to them?

The reply to this is given by Mr. Hounsfield, Vice-President of the British Chamber in Paris. That point had been considered. Canada made her own treaties, and he did not think it was for the British Government to interfere with them in any way. He understood that Canada was quite willing to place France on the same footing, if France would treat her in the same way that England did.

We foresee great difficulty in dealing with the principle of the resolution. Free-traders, to a man, must oppose it on principle, and we question very much if the British Government would run the risk of imposing countervailing duties, however desirable from the protectionist's point of view, which might have the effect of dislocating trade. It is a question which deserves to be argued in all its aspects, but it is one which cannot fail to once more bring forward all the stock arguments which have been used in the fights of Free-trade *versus* Protection.

WATER FOR IRRIGATION.

All fresh water is not suitable for irrigation purposes. More especially is this the case with spring waters and with artesian flows. Some of these contain so much alkali in the shape of sal soda, glauber salt, and common salt as to be useless for agricultural purposes, and if ignorantly applied to crops would produce "black alkali," fatal to all farm crops.

It needs only a reference to one well-known spring district in Southern Queensland, Helidon, to show how certain salts so impregnate the water, that, however valuable such water may be from a medicinal point of view, it would be fatal to employ it for the purpose of irrigating farm crops.

Amongst the numerous bores put down all over the colony, there are many, the water flowing from which is highly mineralised, and which cannot be used for irrigation purposes. Such a flow was tapped a few years ago on Tambourine Mountain, on Mr. Villiers Brown's property. This water was so heavily charged with various salts as to be useless even for drinking purposes.

We are led to consider this question of spring waters since it would appear that irrigation will, in the near future, be largely resorted to by sugar-planters. So important is this matter of irrigation, that Dr. Maxwell and his assistants have, at the very outset of their work at Mackay, been analysing various samples of water which it was supposed might be used for irrigating the canefields. We have no official information of any results of these analyses, but we believe that several samples have been found to contain matter which would prove injurious to any crop irrigated with it. The great importance of this preliminary work can scarcely be overrated, and no water should be used for such a purpose until it has been pronounced innocuous by a competent authority.

A very large portion of the time of the chemists of the Agricultural Experiment Station of the University of California is taken up with the examination of waters sent in by private individuals. In fact, so important is this work considered that other necessary work is left in abeyance whilst the water analyses are being made. In many instances they have found the water so highly charged with alkali as to make its use on the land dangerous to vegetation. Only one of a very large number of samples examined proved suitable for general use, that of a mountain creek near Hollister. It was "hard," and would doubtless form a crust if used in boilers, but that trouble can easily be overcome.

This water contained glauber salts, 3.07 grains; common salt, .68 grains; sal soda, .62 grains; lime carbonate, 10.05 grains; a total of 14.42 grains of salts per gallon.

On the other hand, water from other creeks and from the Pecos River, in New Mexico, contained 127, 171, and 185 grains of salts, the principal being sodium chloride and carbonates.

Out of sixteen spring waters, only six were found to be suitable for domestic or irrigation purposes.

Of common well-waters, thirty-eight samples were analysed, and most of them were found to be too hard from the presence of lime salt, and could not be safely used for permanent irrigation, as, unless the soils were very deep and sandy, and systematic washing-out was practised, there would, in the course of a few years, be an accumulation of "white alkali" (glauber and common salt) which would injure crop production. Amongst the artesian waters examined, a few could be used for irrigating very light, pervious soils, and then only in large amounts sufficient to soak beyond the feeding roots.

Professor E. W. Hilgard says that, "*generally speaking, any water unfit for domestic use on account of the saline contents should be used for irrigation only after an examination of the nature and amount of the latter.*" The limit usually given for drinking waters is 40 grains per gallon."

We shall recur to this subject in a future number of the *Journal*.

IRRIGATION.

In countries blessed with a plentiful supply of water, irrigation of crops is largely carried on. The great need for irrigation is clearly shown by the frequent failure of the crops in Queensland. The same need is found in the Western States of America, where the experiments carried on by the Office of Experiment Stations on the most arid lands has proved them to be remarkably productive. And even in the eastern States, the many crop failures which have occurred have drawn attention to the necessity for storing the flood-waters of the rainy season or of erecting pumping plants to make good the shortage in seasons of drought.

Professor E. B. Vorrhees, of the New Jersey Experiment Station, estimated the losses in the hay crop alone last year at over £300,000, and vegetables and small fruits suffered even more severely. His investigations were made for the purpose of determining whether the increased yield resulting from irrigation during three months of drought would be sufficient to pay for the necessary storage tanks or pumping plants. Careful records were kept of the yields of plots which had received the same cultivation, some being irrigated, and others receiving only the natural supply of moisture. The increase in the yield of the irrigated plots over the others varied from 339 quarts of raspberries per acre, worth £4 15s. 5d., to 1,030 quarts of blackberries, worth £19 9s. 3d.

The cost of plants of the size necessary to supply 10 acres of small fruits and garden crops has varied in the different experiments from 230 dollars to 500 dollars (£17 18s. 4d. to £104 3s. 4d.) The owners are in every case satisfied that their outlay has been returned with considerable profit, whilst in nearly every case they state that they have paid for the plant with the receipts of increased crops during the first year it was in operation.

Testimony such as the above should not be lightly disregarded in the State of Queensland. It has been proved at Mackay that the yield of sugar-cane has been materially increased by the adoption of irrigation. Lucerne crops have been doubled by its application, and hundreds of acres of maize, potatoes, and other crops would have been saved during 1900 had a plentiful supply of water afforded means of irrigation. It is what will have to come, and irrigation is, we believe, included in Dr. Maxwell's methods of increasing the yield of sugar-cane. People are apt to wonder how it is that the Chinese market-gardeners can raise plentiful supplies of vegetables during the hottest season of the year. It needs only a visit to their gardens to show that their success is owing to three things—deep cultivation by hand, liberal use of manure, and regular watering. If the same methods can be applied to large areas, there is no reason why the average yield of cane should not be raised to 40 tons per acre, of wheat to 40 bushels, of maize to 70, 80, or even 100 bushels. Suppose

an irrigation plant to cost £200, and, under the provisions of the Agricultural Bank Act, such a sum will not be beyond the means of any good farmer; by its help he either saves a crop from total loss or doubles a fair yield. If he adds 20 bushels of maize per acre to his usual crop of 25 or 30 bushels, this would mean on 50 acres an addition of £3 per acre, or a total of £150. In two seasons the cost of his irrigation plant is more than repaid to him. An additional 20 tons of sugar-cane would give him £10 per acre, or £500 on 50 acres. There can thus be no question of the enormous value of irrigation combined with good cultivation and the use of suitable manures, and those who are in the happy position of having a good water supply will do well to study this matter from a business point of view.

PHOSPHATES.

Not only in the Southern States, but also in Tasmania, a reward either has been, or is proposed to be, offered by the Government for the discovery of phosphatic rock. It seems most remarkable that, in a country where lime, coal, kerosene shale, the precious metals, almost every known mineral, and many precious stones are found in more or less abundance, as in Australia, no trace of phosphatic rocks has yet been found.

The phosphatic deposits found in such abundance in Carolina, U.S.A., in England, and other parts of Europe consist of the fractured and rolled bones of extinct and also of recent gigantic sea-animals, such as whales, sharks, sea-lizards, such as the extinct ichthyosaurus, which existed at one time of the world's history in millions in our seas and oceans. These fossil bones are found in enormous quantities on the coasts of Suffolk, Norfolk, and Essex, and it was not long before the value of the deposits as a manure rich in phosphoric acid was discovered, and the late Sir John B. Lawes, of Rothamstead, set to work to prepare his "super phosphate," erroneously known as "*coprolite*" manure. Many thousands of tons are annually sold, and the demand is still increasing. Some of the deposits are so hard as to require powerful grinding machinery to reduce them, after which they are dissolved in sulphuric acid to render the phosphate of lime available as manure. In other cases the fossil bones are found in the green sand, and require very simple grinding machinery and no subsequent process to fit them for agricultural purposes. Phosphoric acid occurs in soils principally in combination with lime as phosphate of lime, and this constituent enters largely into the composition of bones, coprolites, and guano, and of a variety of phosphatic minerals, such as the Norwegian and Canadian apalite, Curaçao rock phosphate, the South Carolina phosphate, and others. England imports some 600,000 tons of these minerals yearly, and from Charleston (South Carolina) there are annually exported some 150,000 tons.

We know that the continent of Australia was at one period of the world's history almost entirely submerged beneath the ocean. The famous Cloncurry copper-mining district was an island in an ocean. At that period vast numbers of huge marine monsters existed in what are now the Pacific, Indian, and Antarctic Oceans. Can it be possible that the solid remains of these creatures have been completely swept away? This can scarcely be the case, for we know that huge skulls and bones of antediluvian land animals and remains of marine fauna have frequently been disinterred from the black soil banks of various creeks on the Darling Downs. Somewhere beneath the surface there must be immense deposits of their bones, possibly solidified into a rocky mass. At Clifton a bone, apparently the leg bone of some gigantic prehistoric bird, such as the *Dinornis*, was found a few years ago, completely petrified, and some immense thigh bones, also petrified, were picked up in the creek.

In the neighbourhood of Chinchilla there are masses of broken bones to be found, amongst which were discovered skulls of the Australian marsupial tiger in perfect preservation. That phosphatic rocks have not been found is no argument against their existence, and deposits may yet be found in some portions of the States not yet visited by scientists.

AMOUNT OF MUTTON ONE ACRE WILL PRODUCE.

With the closer settlement of the rich lands of the Downs of Southern and Central Queensland, new methods of mixed farming and intense cultivation will most assuredly be adopted. Already it has been shown that the fattening of store sheep for the market has been attended with marked success, notably at Gowrie, the property of Major H. V. King. Sheep form a portion of the stock of farmers in most parts of the world. In this State, however, dairy cattle to a great extent take their place. That it is quite within the bounds of possibility to fatten ten sheep to the acre is shown by the subjoined article published in the Journal of the Department of Agriculture of Western Australia:—

To illustrate the possibilities within the grasp of the farmer for turning his land to proper account by the production of winter mutton, the amount of mutton that it is possible to produce from the crops grown upon one acre will now be shown from authentic data.

Selecting for our ration, corn silage, clover hay and oats, and basing our calculations upon an acre producing 6 tons of fodder corn, 2 tons of clover hay, or 33 bushels of oats, the relative portions of an acre for growing each of these feeds will be for the corn 16 per cent., for the hay 31 per cent., and for the oats 53 per cent. This will give an average product per acre of 1,920 lb. of silage, 1,240 lb. clover hay, and 630 lb. oats. With a daily ration of 3 lb. of corn silage, 2 lb. of clover hay, and 1 lb. of oats, the produce from an acre will feed one sheep 630 days. The ration given is the maximum amount that a matured sheep, weighing 175 to 200 lb., will consume. A less quantity will suffice for younger sheep, and better gain for food eaten will be obtained. Accepting as a basis for calculation the average results obtained in experimental sheep-feeding by the various stations with rations not altogether dissimilar to the one herein given, it will be found that the increased weights obtained will range from about 9 to 15 lb. for thirty days' feeding. This, then, will give us an average gain of 12 lb. per month. It will be noted that an acre is capable of producing sufficient feed to supply the wants of a fattening sheep 630 days, or ten sheep sixty-three days. Allowing a gain of 12 lb. per head for every thirty days, we have, as the result of the feed from 1 acre, a gain of 252 lb. live weight, worth at least £2 2s. This does not represent the full amount of feed that an acre is capable of producing during the whole year, as no account has been taken of the aftermath in the clover, or of the value of the rape, wheat, or rye, as a fall and winter pasture, which can be produced in addition to the corn. While this does not represent very large direct returns from the land, it is of interest from the fact that this system of farming in conjunction with wheat-growing will put off the day of purchasing artificial fertilisers almost indefinitely.

MARKETS, MARKETING, AND THE BETTER DISTRIBUTION OF FARMERS' PRODUCE.

At the request of the farmers and planters of the Logan district, we reprint a paper on the above subject, which was read by Mr. F. W. Peek, of Loganholme, at the Farmers' Conference at Rockhampton on 1st July, 1898. The question of the best way of marketing farmers' produce is one of vital importance to all agriculturists, market gardeners; and Mr. Peek's paper will, we believe, be read with much interest. Mr. Peek said:—

Before reading the paper on this subject standing in my name, I would desire to record the assistance I have received from Mr. J. D. Ritchie (Secretary of the Department of Agriculture, New Zealand), Mr. G. Jameson (manager of the Farmers' Co-operative Association, of Canterbury, New Zealand), and Mr. H. L. E. Rütthing (Brisbane), who have kindly forwarded me papers and information that have given me great assistance in dealing with this question.

The reason I selected this paper is because I have been in receipt of a large correspondence from farmers and members of the association and others living in the district which I have the honour to represent at this Conference, and also from other associated bodies, pointing out the evils of the present system (or want of system) in the disposal of agricultural and horticultural products; and this being a question of vital importance to the agricultural community of Queensland is well worthy of every consideration. Up till very recent times the markets and the marketing have been of a very primitive description. Many farmers followed the old-fashioned custom of bringing their produce into town (when their closeness to towns allowed of such being done) by spring carts, wagons, &c., hawking what they may have to dispose of—it may be fruit, butter, eggs, potatoes, &c.—from door to door. Others, again, take their produce to stores and retail dealers, and, following the usual custom, have allowed such storekeepers and dealers to actually fix the price they themselves should pay for it, and it can be fairly stated that the farmer gets no more than the shopkeepers and dealers can possibly help. Others, again, send their produce by railway or boat, and consign it to agents for competition in open markets to auctioneers, &c., whose conditions are that the farmer or consignee has to pay such agents from 5 or 7½ to 10 per cent. for selling. Then there are storage and wharf rates, railway freight charges, cartage, bags, bales, cases, &c., which all have to be deducted from the price obtained for the produce disposed of, and which, owing to the number of hands the produce has to pass through, each requiring a profit, have given cause for complaint for farmers. In some instances letters have been published in the Press of this colony from indignant farmers who, after planting, growing, and gathering their crops, and sending them to the so-called market, have received a notice from their agents informing them that their produce sold had not (or barely) covered expenses. Surely, then, this question of providing a better system of marketing deserves every consideration. The desire of the farmers to control, as far as they possibly can, the prices to be obtained for their produce is not only natural but reasonable. The cut-throat system pointed out and the means hitherto used have not been the best, either in management or in the way of returns, to the pockets of those who have been the pioneers in opening up land, growing produce, and starting industries therefrom. Any person dealing with this question of markets, marketing, and the better distribution of farmers' products must take into consideration the class of produce for which a market is required, and also the demand for such produce, which may be overproduced or insufficiently produced, thus causing a so-called glut or otherwise. When produce is scarce, an artificially increased value arises. When the so-called good season comes round and the produce is plentiful, low values ensue and poor prices are obtained. Farmers suffer because their freights, rates, and expenses are not lower proportionately—with the results, as before stated, of hardly being sufficient to clear expenses, and certainly not enough to fully repay them for their time and labour. The question then arises—How is this overproduction to be avoided and a better distribution obtained? The answer is: By the combined action and co-operation of those interested. When the farmers of this colony realise that individual effort is powerless, the sooner will their conditions of being able to control the produce markets be attained. The farmers, by co-operating, have the power in their own hands of regulating the markets as to under or over production, and can, by their combined action, be the means of assisting the small farmer and the struggling settler from going to the wall, prevent the undue competition of one against the other, and enable him to get a fair price for his produce. In the matter of better means of distribution, great assistance could be given to farmers, and especially to those small farmers with a variety of crops, garden and fruits, &c., if a system of cheaper uniform railway freights could be adopted on all Queensland railways—say at 6d. per case of 56 lb. weight irrespective of distance. I am sure it would be the means of disposing of a quantity of produce to those settled in the Western townships and lands of the colony. This matter has already

been brought under the notice of the Railway and Agricultural Departments and the Farmers' Representative Union in the present Parliament by the Logan Farmers' Association. It is gratifying to note the steady increase of farmers' associations and agricultural societies and combinations in Queensland. They now number upwards of ninety or 100, and they can, and should, be the means of advancing the mutual welfare and benefit of its members by holding meetings fortnightly or monthly, and inducing others to join with them. The main object and aim should be to become practical and useful. At such meetings the members should discuss the best means of advantageous purchase of implements, seeds, &c. They should table for their members the latest agricultural publications of an up-to-date nature (from which extracts could be read for general information) and a list of reliable agencies (with whom members have had dealings and could speak from experience as to prices obtained). Then they could form branches in other parts of each district, with duly appointed delegates to the head centre—whereby the requirements of each part of the district could be made known and advocated—and thus prove, by combined action, that far better results in the disposal of farmers' products would be realised than by individual or single efforts. I have endeavoured to show an initial step towards securing the object for which this paper was prepared—namely, the better system of marketing and distribution of farmers' products to the consumers. That is by combining and meeting together to discuss these questions. I know this means a new departure from the usual habits of our farming community, whose mode of life and occupation fosters a feeling of isolation; but this feeling is soon removed by friendly intercourse and sociability, and when the question of combined action and co-operation is explained (showing the farmer how, by the present form of marketings, he is entering into competition with his neighbour—the results tending to a direct loss to both—and that means low values, when by co-operating and combining for higher prices better results would accrue to each). If the farmers wish to obtain all the benefits of practical co-operation for marketing purposes and to extend their influence they must have one head or central council, which should be representative of all districts—elected by and representative of each association equally; but, owing to the geographical conditions of Queensland, it might be thought advisable to some to have a central council in each of the three divisions of the colony—say, North, Centre, and South—and yet working under the same co-operative rules and organisation. Anyway that is for after consideration once such extended co-operation takes place. Funds, and large funds, will be required by those who will be entrusted with the carrying out of the objects for which the combination has been formed in its management. The mode of operations would have to be determined by its members and the officers forming the governing body, who would have direct control. In the raising of funds, I would favour the formation of a registered joint stock company, with a limited liability, such being formed by farmers among themselves. I would limit the number of shares to each member. With a central board of directors, as advocated, it would help to do away with the little prejudices that arise in small district combinations; and the farmers by the greater union of all districts for marketing and other purposes—put in the charge and guidance of men of their own selection—would rest assured that the aims and wants of each association or district would be fairly dealt with. Let us now proceed to consider more in detail what co-operation for the control of markets and better distribution of products means. Co-operation is of two kinds—namely, either that of the buyers or consumers, or that of the sellers or producers. We are told that true co-operation unites both in a community. It may appear like a conflicting statement that a co-operation of buyers and sellers can be brought together to agree, seeing that their interests are directly opposite—the sellers desiring to get the highest monetary value, whilst the buyers desire to get cheaply. The true principle of co-operation to control the markets consists in the combination of many to secure a benefit to all, and no matter how the farmers and producers of one district may combine

and hold out for fair prices—it may be of maize, wheat, or fruits, &c.—if others in the adjoining districts using the same open market will not combine with them, they will have to be met by competition. It would be no use in such circumstances holding out for fair prices that could—and might—be agreed upon by the union of all districts were they combined together for that purpose. But now with competition comes in that bad feature of the present system which we have to contend with—namely, the ring of wholesale dealers or middlemen. Under the system of auction sales there are rings of buyers who make it a matter of arrangement not to bid beyond a certain price. The only way to meet this difficulty is a direct appeal to the consumer to join and help you. With the capital you have raised by forming the joint stock company previously referred to (formed by shares being taken up by the members of each district association, the monthly payment of which should be made as light as possible), the co-operated farmers could establish stores for supplying the wants of its members in each district, also depôts where the produce could be collected and either sent away or distributed in other parts of the colony where required. The consumers must have every inducement held out to them to deal direct with the farmers' association. They will thus be assisting the producers and consumers to do away with that loss that goes into the pocket of the middleman, who, at the present time, gets the difference between the price realised by wholesale dealings by auction sales and the retail dealings of the shops and stores. As a further inducement to the consumer, a bonus or percentage could be returned on all purchases made at the association stores, which is the usual mode adopted by co-operative societies—with the difference (and which is an important one) that such markets, depôts, and stores would be established by the farmers or producers, and not, as hitherto, by the consumers. Such a scheme would enable the farmers of one district to benefit those of another by interchange of products produced in the one and consumed in the other. The markets would be better regulated if each district were so combined together under one head. The estimated wants and requirements of each district could be ascertained, and the produce distributed accordingly. There would be no glut, as the market would be regulated according to requirements, and more even prices would be maintained. The farmers, being able to deal direct with the consumer, would get a better price for their produce, and the consumer getting the best produce that could be put on the market—carefully put up and graded as to quality—would also receive a return or share in the profits made, from his dealings with the association. I might further enlarge on the benefits to be obtained from affiliation with the co-operative centres of other colonies and with those of England and the continent of Europe (who would take over our surplus production, easing our markets so that even prices would be upheld), and on the establishment of a wholesale farmers' co-operative association. But I can rest here. I have pointed out a preliminary scheme that is not only practical by the combined action and co-operation of the various societies and associations under one centre to control the markets and give a better distribution of farmers' products, but have shown the great benefits that would accrue to the consumer by dealing direct with the producer, whose interest it would be to supply a superior class of produce (each district vying with the other to obtain the best results). To further emphasise the usefulness and success of such institutions, I need only bring before your notice the last yearly report of the New Zealand Farmers' Co-operative Association of Canterbury, Limited, which began operations and was registered in 1882 by seven shareholders holding 141 shares. The balance-sheet for 1897—just fifteen years from its inauguration—states that there are 2,738 shareholders with 21,181 shares. The subscribed capital is £105,905, and the paid-up capital £43,260, and there is a reserve fund of £17,097. The total profit for the year amounted to £11,692, and a dividend of 6 per cent. and a bonus of 4 per cent. on the called-up capital, a bonus of 4 per cent. on all purchases, and a similar bonus on salaries and wages earned were given. Surely such great results

in a sister colony are worthy the attention of our producers and consumers, with such resources as we have at our command. The assistance that is extended to agriculturists by the Government of this colony; the information that is being disseminated by the Agricultural Department, its officers, and experts in all branches; the practical teaching and training at our schools and college; the formation of State nurseries and experimental farms in various portions of this colony (where is being demonstrated the number and variety of products of every description that can be successfully grown)—all this is tending to foster the interest of our farmers and producers. Then by combining under an efficient organisation and assisting each other, through their associations, in the development of their respective districts, they will be placed beyond the combined rings of wholesale dealers and middlemen, become independent of local storekeepers, and be induced to produce their best to supply their own retail stores. Once the thing is fairly started, and its benefits begin to be realised, it will be seen that combined action and close association is a practical means to an end for its own sake, and will bring a fairer share of wealth to the pockets of the producers and workers in the agricultural interests of this colony. I may be thought to have been indulging in Utopian ideas; but the true solution of better systems of marketing and distribution of farmers' products must, and will, be obtained by the united co-operation of the agricultural and producing interests of this colony.

THE PEANUT OIL INDUSTRY.

The American Consul at Marseilles, reporting lately on the peanut oil industry, observes that more oil is extracted in Marseilles from oleaginous seeds than in any other place in Europe, and the industry is beginning to flourish again after the depression produced by the introduction of American cotton-seed oil and the failure of the seed crops elsewhere. As no special machinery or process is employed in the manufacture of peanut oil as distinct from other oil seeds, the manufacturers crush arachides, or peanuts when the market is favourable, but not to the exclusion of other seeds. Last year over 71,000 tons of peanuts reached Marseilles; at Bordeaux a large quantity of West African nuts of good quality is crushed, and there are some mills in the north of France, but Marseilles stands pre-eminent in the industry. The nuts are scarcely ever ground whole, as this produces inferior oil and cake of little value. In fact, a large quantity of the nuts arrives shelled, after which the inner or red skin is removed as much as possible by processes resembling those for cleaning wheat in flour mills. These are described in detail in the report. After the kernels have been separated and cleaned they are ground and enveloped in strong fibrous mats, are subjected to hydraulic pressure, and the clarifying of the oil done by means of filters and fuller's earth. The husks are sometimes ground with the cake, and form an inferior food for cattle, and when coal is dear they are used as fuel in the oil mills. The crude oil runs out thick and troubled, and must be filtered to make it a bright yellow, while if it is to be water white in colour it must be treated further with animal black and fuller's earth. It is stated that no alkaline lye is used, but the art is somewhat secret. The sources of supply are Bombay, Mozambique, and Senegal. In some years the African supply is wholly swamped by the supplies from India, and at one time it seemed that Africa would be unable to compete permanently with India. But though the latter still sends large quantities of nuts to Marseilles it appears to be using more and more of its crop at home, so that, while the imports between 1890 and 1895 were mostly from India, in 1896 to 1899 they were mainly from Africa. In the earlier year of the decade American cotton oil menaced the crushing trade of Marseilles with extinction because of its low price, but apparently new demands for oils have arisen, for the production in Marseilles has returned to

its former average, and prices also, after serious derangements, have resumed their old level. There has been a world-wide decrease in the amount of animal grease, while America is consuming her own cotton-seed oils in vastly increased quantities, and the consequence is an increased demand for vegetable oils. Although the production of the nuts in Africa is enormous, no improvement in the mode of cultivation or the price is anticipated for years to come. The soil is readily exhausted by the crop, and nothing is done to restore its virtue; labour, though cheap, is thriftless, and hard to obtain when wanted, and transportation is defective. The uses of the oil are numerous; it is described as "the most polymorphous of all oils, adapting itself to all purposes, including nutrition, lighting, lubrication, and blending." It is the most difficult of all oils to detect when adulterating olive oil, for its chemical reaction is white. The best qualities are, in fact, used for the table, either pure or mixed with olive or sesame oil; as an illuminant it gives a soft white light; when neutralised it is much esteemed for lubricating, and is always preferred to cotton-seed oil. It is also largely used in the manufacture of soap, and is the characteristic component of the famous Marseilles white soap.—*London Times*, 13th October.

FLAX CULTURE.

Last month we drew the attention of farmers to the value of flax as a crop, both for seed and fibre, and we printed an article on the subject from the *Pastoralists' Review*. The *Sydney Morning Herald* some time ago wrote concerning this plant as a field crop, that the flax crop does not easily suffer from drought. Now this is just the kind of plant required in this State. When, as has lately happened, the maize, potatoes, and other crops fail, owing to want of moisture, then is the time that a drought-resisting crop would come in and save the farmer from total loss. It is putting all the eggs in one basket which causes disaster. A sugar-planter the other day stated that had he stuck to sugar-cane alone he would have been a ruined man, but, by combining sugar-growing with the raising of other crops and fruit, he was making a net income of £500 a year. Such experience should surely be conclusive.

It does not follow, because someone in some other country has made a fortune by some particular crop, that it will pay a farmer to rush in blindly and put many acres under a crop he knows nothing about except from what he has read. The proper way is to try a small patch of this crop or the other. If it turns out a success, then a larger area may be put down, still keeping what may be called the regulation crops going. There are so many things that have proved themselves adapted to our various soils and climates that the wonder is we still stick to the old crops without adding anything new. The unknown seems to have terrors which the farmer declines to encounter. It was exactly the same with cotton, sugar, coffee, rice as it is to-day with hemp, flax, sesame, and a host of other plants grown either for seed, fibre, grain, or bark, the world's demand for which is never satisfied. But, because they are new to us, we pass them by to our own detriment.

The cultivation of flax for fibre purposes would doubtless yield a profitable return in many parts of this State, and it is equally certain that on dairy farms, where a large quantity of skim or separated milk is available for feeding calves and pigs, the growing of flax seed for mixing with the milk would pay the farmer handsomely. The cultivation of this crop is simple and inexpensive, and for stock-feeding purposes, at least, it is one of the most useful products that can be raised. It is not necessary, nor is it desirable, that the soil on which flax is grown should be very rich. On the contrary, excessive luxuriance of growth is injurious, and generally results in the crop being "laid," which renders it comparatively worthless either for fibre or seed. The best soil is a sound, dry, deep loam, with a clay subsoil. By good and careful cultivation, however, flax may be grown on various soils, but the class of soil just mentioned will be found to give the best results. In the preparation

of the soil for the crop, one of the points of greatest importance is that the land should be thoroughly cleaned of weeds, and made into a fine state of tilth of a moderate depth. The soil to a depth of 3 or 4 inches cannot be too fine. If the autumn cultivation has been carefully carried out, a good harrowing in spring will generally effect perfect pulverisation of the soil. Following the last harrowing it is necessary to roll thoroughly, in order to secure an even surface and consolidate the land, which may be broken up again with a short-toothed or brush harrow before sowing, drawn up and down in the direction in which the land had been ploughed. The seed best adapted for the generality of soils is Riga, although both Dutch and American varieties may be used with equal success in certain localities. In purchasing seed a point should be made in seeing that it is plump, shining, and heavy, and of the best brands, from a reputable merchant. It should be seen that it is free from the seeds of weeds; this will save a great amount of trouble afterwards when the crop is growing. Home-grown seed is usually the most reliable, and we would, therefore, recommend every farmer to only sow each year as much foreign seed as would produce a sufficient quantity for his flax crop the following season. The produce of seed averages about 12 bushels to the acre, so that the seed saved of 1 statute acre would sow about six. In growing flax for fibre, it is better to sow thick than thin, as with thick sowing the stems grow tall and straight, with only one or two seed capsules at the top, and the fibre is found greatly superior in fineness and length to that produced from thinly sown flax. The latter usually grows coarse and branchy, and produces a large quantity of seed, but very inferior quality of fibre. It is not advisable to grow flax more frequently on land than once in three or four years. It does well, as a rule, after a grain crop, but in America and the Argentine the usual practice is to sow flax on the sod on newly broken up land. In those countries it is held that the crop is more beneficial to new land than a bare fallow, as it materially assists in pulverising the sod, and from the shade it affords helps to retain the moisture in the subsoil. There is every reason to believe that this practice would be equally successful in the wheat-growing districts of New South Wales. It is true that flax is a somewhat exhausting crop on the fertility, but this may be more than compensated for in the better condition the soil is left after it, compared with the pulverising effects of a bare fallow, and the system is, at any rate, worthy of a trial. The flax crop is not easily drouthed if it gets a fair start, and covers the ground fully before the dry weather sets in. Its roots penetrate much deeper than the wheat plant, and it will succeed almost anywhere with a rainfall averaging 20 inches and upwards per annum.

EXTRACTS FROM THE MONTHLY REPORT FOR DECEMBER OF THE BIGGENDEN STATE FARM.

I regret to have to report a continuation of the unprecedented drought we are now afflicted with. During the whole month only 6 points of rain have fallen in two days.

A good deal of our time has been devoted to preparing an exhibit and attending with it the Degilbo Show, which was held on the 27th and 28th December. This exhibit was composed exclusively of products grown during the current year, and the greatest part during the present adverse season.

I am glad to be able to report that our display has met with the approbation of the farmers and the public in general, who have pronounced it to be comprehensive, varied, and tastefully staged. Personally, I am inclined to think that our splendid samples of maize, sorghums, millets, cow peas, pea nuts, onions, all sorts of roots, tomatoes, &c., have served better than any lectures or newspaper articles to demonstrate the fact that the severest drought can be in a large measure alleviated by means of deep working of the soil and frequent pulverisation of the surface.

The orchard has been kept clean and in good tillage. In view of the protracted dry weather, I have found it advisable to give a good watering to nearly every tree. So far very few have succumbed, and the others have made satisfactory progress.

The cow peas and other pulses sown between the rows of trees have never ceased to grow in spite of the dry weather, and look now as fresh and green as could be desired. They are ready to come into blossom and fruit as soon as rain comes.

In the vineyard the grape vines look healthy, and have made a vigorous growth. It may be remarked that several plants of the *Pineau Noir*, generally known in this State as Black Cluster, have given a very fair crop of bunches exactly sixteen months after the planting of the unrooted cuttings.

I do not remember having ever heard of such precocity anywhere else in the world.

On the 21st we had a bush fire, rendered dangerous by the extremely dry state of the grass and fallen tree leaves and a strong breeze blowing at the time.

We succeeded, however, in saving the buildings and in circumscribing the fire to the south paddock, which was just in need of burning off.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1900.

Farm.

During the month, 32 acres of land have been ploughed in readiness for various crops. The potatoes in the creek paddock were harvested (5 acres); the yield was, however, very poor, owing to the dry weather and the ravages of caterpillars. Lucerne (25 acres) has been cut, made into hay, and stored in shed. An area of 30 acres has been planted with maize. Threshing operations were carried out: 34 acres of malting barley yielded 882 bushels (26 bushels per acre); 2 acres wheat, 72 bushels (36 bushels per acre); and 1 acre oats (tartarian), 20 bushels. The old cornstalks in the "bull paddock" were removed and burnt off preparatory to ploughing.

The aggregate rainfall for the month was .47 inches—.02 December 2nd, and .45 December 5th. Needless to say, the crops here and throughout the whole district are badly in want of rain.

Dairy.

During the month, 58 head of cows were in milk. Six hundred and ninety-seven gallons of milk were converted into cheese, giving a yield of 721 lb., and 1,063 gallons yielded 420 lb. of butter. The cows were grazed on portions of the cultivated plots for a few hours each day. Owing to the extreme dryness of the weather, it was found necessary to feed a number of young purchased stock, stud bulls, and also the young bulls. We sold 1 Shorthorn and 1 Jersey bull during the month.

Pigs.

The increase was as follows:—Pure Berkshires: 10 head—4 boars and 6 sows. Berks-Yorkshire Middle, 15 head.

The following sales were effected:—Pure Berkshires: 1 boar, 5 sows; Middle Yorks, 1 boar, 2 sows; Small Yorks, 1 boar; Tamworths, 2 boars. Twenty-four head of baconers were sold to Hutton and Co. at an average price of 35s. each.



TRIAL OF HARVESTING MACHINERY AT QUEENSLAND AGRICULTURAL COLLEGE.

Dairying.

CARE OF THE PIG'S MOUTH.

Few farmers are very careful about their young pigs. As long as they look healthy, grow rapidly and keep their condition, their owner is satisfied that all is right. But young pigs suffer very much from their teeth. Take a young pig shortly after birth and examine its mouth. There will be found eight little tusks as sharp as needles, two in each of the upper and lower jaws. These it is necessary to remove, as they lacerate the tongue and lips of the young animal, causing it severe pain and making it ill-tempered and quarrelsome. The teeth are usually black or brown, and are easily broken off close to the gum with a pair of pliers, and if this is done within a week of birth there will be no sore mouths.

THE BACON PIG.

A SCALE OF POINTS.

It is perhaps too much to expect that there will ever be entire unanimity of opinion among judges as to what constitutes the perfect type of bacon pig, yet it is something greatly to be desired, and an effort should be made to come as near to this desired end as possible, says Professor Day, Ontario Agricultural College. The main difficulty in judging seems to arise from the fact that judges differ regarding the relative importance of the various parts of an animal. They may be in entire accord as to what constitutes a perfect bacon pig, but, unfortunately, perfect animals are scarce, and it is in the attempt to balance one defect against another that differences in judgment frequently occur. It would seem reasonable, therefore, to assume that some authoritative standard of excellence and scale of points would be helpful in bringing about greater uniformity in judging.

There exists in the minds of some people a very strong prejudice against a scale of points, yet no judge worthy of the name ever makes awards in a show-ring without a standard of excellence and scale of points in his mind. That is, he has his own ideas as to what constitutes perfection in the various parts of an animal, and he also has his own ideas as to the relative importance of these various parts. Without these things he cannot judge, for he has no basis upon which to make awards. The actual use of a score card in a show-ring is to be condemned. Scoring animals is a useful practice for the student, training him to notice all points of the animal, forcing him to make up his mind whether defects are serious or otherwise, and guiding him as to the relative importance of parts; but all this should be learned before a man attempts to act as judge. The scale of points, then, is merely a means towards an end. It is an aid to judgment, but cannot take the place of judgment. It can serve merely as a general guide to judges, and, properly used, will aid in securing uniformity.

The preparation of a scale of points is no easy matter, and the scale presented here is not claimed to be perfection. It represents an effort to put the question in a tangible form, in the hope that something authoritative may result. In the scale of points given herewith an attempt has been made to distinguish between a breeding animal and one intended for slaughtering. It is quite apparent that in breeding animals weight limits should not be used. On the other hand, an animal that is to be slaughtered need not be criticised as to eyes, ears, hair, style, or the strength of its pasterns, while weight becomes very important. The following is the suggested scale of points:—

Head and Neck—8 points :

Snout, moderately fine	1
Eyes, good size, full, and bright	1
Jowl, light and neat	3
Neck, medium length and rather light	3

Fore-quarters—17 points :

Shoulders, light, compact, no wider than back	9
Breast, good width and full	4
Fore legs, set well apart, and straight; pasterns, upright; bone, moderately fine	4

Body—40 points :

Back, medium width, forming a slight arch from neck to tail	9
Loin, strong and full, but not unduly arched ...	5
Ribs, good length and moderately arched ...	3
Side, fairly deep; long and straight between shoulder and ham; a straight edge laid over shoulder point and ham should touch the side throughout	12
Heart girth, filled out even with side of shoulder; there should be no tucked-up appearance back of fore legs, nor droop back of shoulder top	5
Flank, full and low	1
Underline, straight	5

Hind-quarters—15 points :

Rump, same width as back, long and slightly rounded	5
Ham, full; thigh, tapering and carrying flesh well down towards hock	6
Hind legs, medium length; hocks, set well apart but not bowed outward; bone, moderately fine; pasterns, strong	4

Quality—15 points :

Ear, rather thin (1); hair, fine and abundant (2); skin, smooth, showing no tendency to wrinkle (2); bone, flat and clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder (5); flesh, firm and smooth, with no flabbiness at jowl, fore-flank, belly, or ham (5)	15
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Style—5 points :

Active and sprightly in movement, and standing well up on toes	5
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Perfection 100

The head and neck have very little market value, and consequently should be comparatively light. A great deal of the weight of the head is in the jowl, which should therefore be light. A long, scrawny neck is very objectionable, indicating poor feeding qualities. A short neck is a good thing in itself, but where the neck is very short it is apt to be heavy on top, a formation associated with heavy shoulders carrying a great thickness of fat over the top.

The value of the meat in the fore-quarters is comparatively low, particularly the fore-hock or shoulder. Consequently we want as little shoulder as is consistent with constitution, smoothness of shoulder being especially desirable.

While a "razor back" is not desirable, yet a broad back invariably gives too great a thickness of fat. A flabby, heavy belly with flabby fore-flanks must not be mistaken for a long rib. A fair depth of side is very desirable, but when it goes beyond a certain point it becomes objectionable, because it gives too much belly meat.



“THE CHIEF OF SEAFIELD.”
Pure Ayrshire Bull, at the Penal Establishment, St. Helena.

EFFECT OF FOOD ON THE HARDNESS OF BUTTER.

An extensive series of experiments has just been concluded at the Maine Agricultural Experimental Station, the object of which has been to determine the effects which different foods have on the hardness of butter. The following conclusions have been arrived at:—

1. The hardness of butter can be regulated to a large extent by the food of the cows.

2. Gluten products (such as meal, feed, &c., containing large percentages of oil) produce soft butter, and should not be fed to cows used for butter production.

3. Meals containing less than 3 per cent. of fat, and high percentages of protein, when fed in combination with maize and bran, will make butter of sufficient hardness.

4. Glutens, if freed from fat, will not produce butter of more than normal hardness, and do not have the hardening effect of cotton-seed meals.

5. When a very hard butter is desired, a little cotton-seed meal should be fed.

VALUABLE IMPORTED BULL.

The St. Helena dairy herd has received new blood by the importation from Victoria of a young Ayrshire bull (Plate VI.), sixteen months old, and said by Mr. C. F. Hegarty, of the Willows, Bacchus Marsh, Victoria, who purchased the animal on behalf of the Queensland Government, to be the best in Victoria or even in Australia, and as to the milking strain it is positively unsurpassed. His dam, says the same authority, is a model of an Ayrshire and also of a dairy cow. The price paid was 100 guineas. The same price was offered by Mr. Hegarty for the dam, but the owner would not sell her, although she is nine years old.

The bull is named The Chief of Seafield, and the following is

HIS PEDIGREE.

Pure Ayrshire bull, The Chief of Seafield, dark-brown and white. Calved 31st August, 1899, bred by John Grant, Seafield, Tullamarine.

Sire—Duke of Glenside (A.H.B. 173).

Dam—Dot 3rd (A.H.B. 101), by Bruce (A.H.B. 11)

g d Dot 2nd, by Norman (A.H.B. 65)

g g d Dot, by Colin

g g g d Lady Hamilton, by D. McLean's imported bull

g g g g d Blanche, imported from Scotland.

Duke of Glenside, sire of Chief of Seafield (A.H.B. 173), bred by Mr. George Rolfe, Lyndock, Warrnambool.

Bruce, sire of Dam Dot, mother of Chief of Seafield, bred by A. and J. McFarlane, Dunedin, New Zealand.

Sire—Renfrew (A.H.B. 77).

Dam—Pussy (A.H.B. 299); by Victor of Munnoch (imported, A.H.B. of S. 1477 of A. 90).

g d Purity, by Napoleon

g g d Pet, by Fred

g g g d Scottie, by Ayrshire Lad

g g g g d Minnie, by the Bruce

g g g g g d Dolly, bred by D. McLean from his imported stock.

Sire—White Prince (A.H.B. 92).

Dam—May Flower, by Baron 2nd of Drumlanrig (imported)

g d Violet 2nd, by Cashmere Jack (imported)

g g d Violet, by Baron 2nd of Drumlanrig (imported)

g g g d Beauty, imported.

The Chief of Seafield got 1st prize for one-year-old Ayrshire bull, Royal Agricultural Show, Melbourne, 4th September, 1900. Dot 3rd got 1st prize, the champion prize, and Government Gold Medal for best Ayrshire cow or heifer, the Government Gold Medal for the Champion Dairy Cow of Australia, Royal Agricultural Show, Melbourne, 4th September, 1900. Dot 3rd got Lord Brassey's Gold Medal, and the Government Gold Medal for the Champion Dairy Cow of Australia, Royal Agricultural Show, Melbourne, 5th September, 1899.

Flower of Seafield got 1st prize for dairy cow, Royal Agricultural Show, Melbourne, 4th September, 1900. She is out of Dot 3rd. Dot 2nd got 1st prize for three-year-old Ayrshire heifer in milk, Royal Agricultural Show, Melbourne, August, 1891. Dot, by Colin, got 2nd prize for Ayrshire cow, Melbourne Show, 1877. Lady Hamilton got 1st prize for Ayrshire cow, West Bourke Show, March, 1880. Blanche got a gold medal for Ayrshire cow, Geelong Show, 1867.

Duke of Glenside got 3rd prize for Ayrshire bull, three years old and over, Royal Agricultural Show, 4th September, 1900.

Victor of Munnoch is the sire of Mr. W. B. Cumming's imported cow Favourite of Munnoch, a champion prize-taker. Dot 3rd got 2nd prize for one-year-old Ayrshire heifer, 1892; 1st prize for two-year-old heifer, 1893. She was not shown again until 1897, when she got 2nd prize for Ayrshire cow when she was three months milking. She got 2nd prize for Ayrshire cow in calf, 1898. Flower of Seafield got 2nd prize for two-year-old, and 1st prize for three-year-old Ayrshire heifer in calf, 1898; and 3rd prize for Ayrshire cow, 1899, Royal Show, Melbourne.

PURE HOLSTEIN BULL, FRIESLAND II.

This fine animal was lately purchased from Messrs. T. G. Robinson and Co., of Toowoomba, for the Queensland Agricultural College, and promises to be a great acquisition to the already excellent dairy herd of that institution. The bull was brought over to Queensland from South Australia by Mr. A. J. Dixon in October last year.

Its pedigree is as follows :—

FRIESLAND II.

Calved, 5th May, 1897.

Bred by J. W. Porter, Esq., of South Australia, from imported stock on both sides.

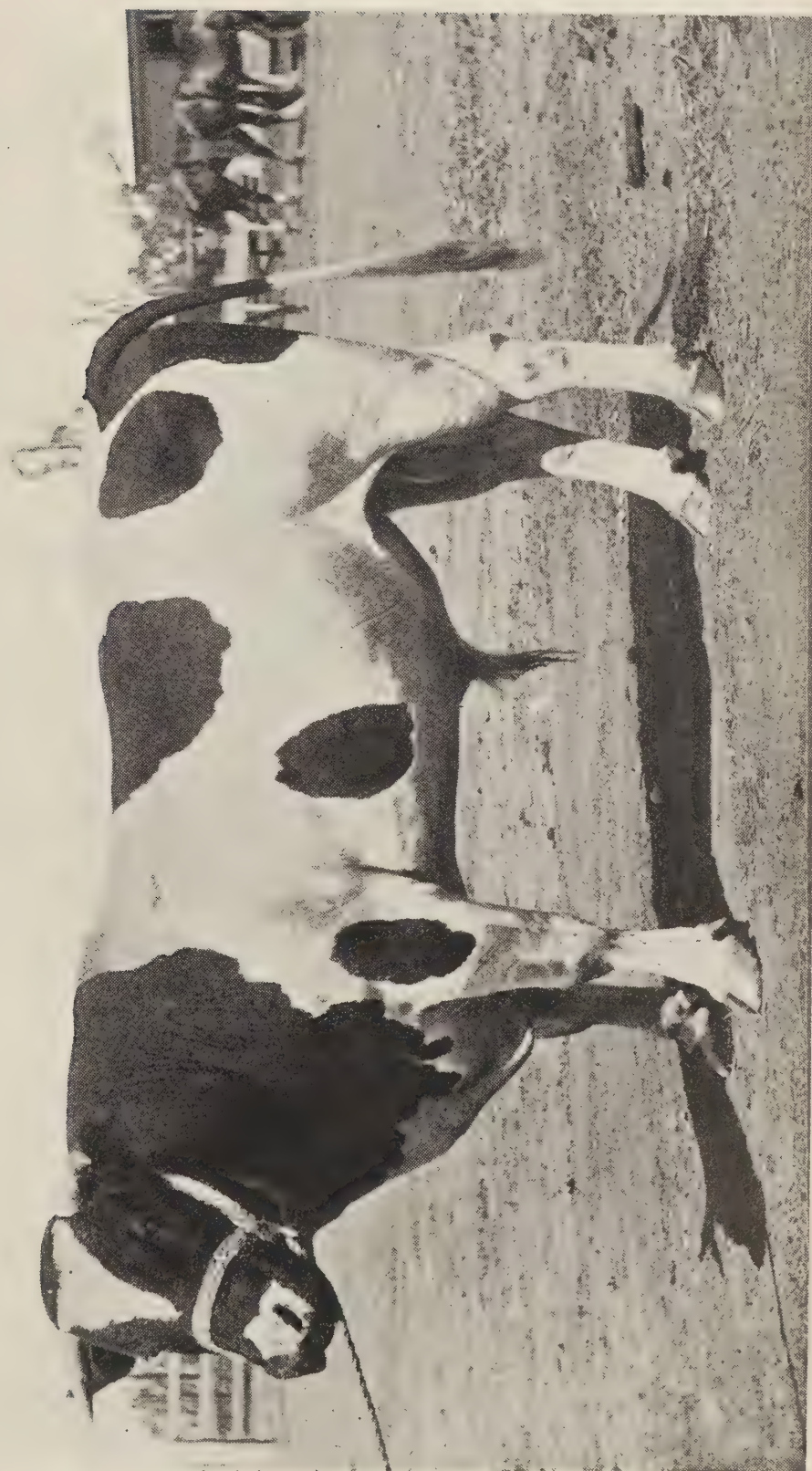
Sire : Friesland, by Taureau 2nd, by Taureau 1st from Dairymaid.

Friesland's dam : Buttercup 2nd, by Taureau from Buttercup.

Dam : Buttercup 9th, by Buttermann 4th, by Sundial from Sunflower from Buttercup 4th.

HIDE-BOUND.

The disease which is commonly termed "hide-bound" is not in the skin, but in the system generally; the skin simply being affected by the general condition of health of an animal. It happens in animals which are suffering from indigestion, imperfect nutrition, and other effects of faulty feeding. For such a case, treat in this way :—Give 1 pint of raw linseed oil; as soon as this operates freely give warm bran-mashes twice a day; in each add one level tablespoonful of an even mixture of ground ginger, gentian, and sulphate of iron. This, with green feeding, will relieve the animal in a short time. Costiveness is one of the most effective causes of this disease of an animal. To relieve this by active laxative medicine will soon lead to recovery.



FRIESLAND II.

Pure Holstein Bull, at the Queensland Agricultural College.

DAIRY HERD.
QUEENSLAND AGRICULTURAL COLLEGE.
RETURNS FROM 1ST TO 31ST DECEMBER, 1900.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Com- mercial Butter.	Remarks.
			Lb.			
Linnet ...	Ayrshire ...	15 May, 1900	305	3·8	12·98	
Lavina ...	" ...	6 April "	454	3·8	19·32	
Rosebud ...	" ...	10 April "	715	3·7	29·6	
Annie Laurie ...	" ...	30 May "	321	3·9	14·02	
Ream ...	" ...	24 July "	511	3·8	21·73	
Isabelle ...	" ...	7 July "	652	3·8	27·63	
Lena ...	" ...	13 July "	666	3·7	27·59	
Leesome ...	" ...	1 Sept. "	868	3·7	35·96	
Ream Routhie ...	" ...	20 Sept. "	654	3·8	27·82	
Ruth ...	" ...	8 Oct. "	543	3·6	21·88	With first calf
Annie ...	" ...	8 Oct. "	437	3·6	17·61	With first calf
Laura ...	" ...	28 Aug. "	506	3·7	20·96	With first calf
Renown ...	" ...	29 Nov. "	440	3·6	17·74	With first calf
Laverock ...	" ...	19 Dec. "	320	3·7	13·25	
Jersey Belle ...	Jersey ...	21 May "	432	5·4	26·12	
Content ...	" ...	18 July "	488	5·0	27·32	
Playful ...	" ...	14 July "	702	4·3	33·8	
Baroness ...	" ...	3 Aug. "	484	4·5	27·38	
Carrie ...	" ...	18 Aug. "	446	4·3	21·47	With first calf
Spec ...	" ...	26 Aug. "	421	4·0	18·86	With first calf
Stumpy ...	" ...	29 Aug. "	745	4·4	36·78	
Eveleen ...	" ...	2 Sept. "	548	5·1	31·1	
Beatrice ...	" ...	3 Sept. "	414	4·2	19·47	
Connie ...	" ...	8 Sept. "	575	4·4	28·33	
Ivy ...	" ...	28 Aug. "	510	4·2	23·99	
Bashful ...	" ...	2 Nov. "	484	4·5	24·38	
Russet ...	Grade Shorthorn	7 Oct. "	654	3·8	27·83	
Alice ...	" ...	13 Nov. "	714	3·6	28·78	
Eva ...	" ...	18 May "	486	3·8	20·88	
Polly ...	" ...	29 Jan. "	122	3·8	5·19	Dry, 20-12-00
Stranger ...	" ...	7 July "	636	3·7	26·35	
Ball ...	" ...	14 Aug. "	135	3·5	5·29	Dry, 20-12-00
Duchess ...	" ...	24 Aug. "	510	3·7	21·13	
Restless ...	" ...	3 Sept. "	614	3·8	26·31	
Rosella ...	" ...	5 Sept. "	720	3·9	31·44	
Lucy ...	" ...	27 Sept. "	745	3·6	30·03	
Leopard ...	" ...	29 Sept. "	682	3·8	29·1	
Redmond ...	" ...	12 Sept. "	726	3·8	30·89	
Pet ...	Grade Jersey	14 Aug. "	544	3·8	23·15	
Fancy ...	South Coast	21 May "	515	4·0	23·07	
Dairymaid ...	Holstein	15 May "	245	3·7	10·05	Dry, 30-12-00
Violet ...	Shorthorn	9 Oct. "	624	3·6	25·15	
Gladly ...	" ...	2 May "	436	3·8	18·5	
Hilda ...	" ...	25 May "	114	3·7	4·7	Dry, 20-12-00
Louisa ...	" ...	6 April "	583	3·8	25·8	
May ...	" ...	20 May "	384	3·7	15·91	
Nestor ...	" ...	21 April "	441	3·9	19·26	
Spot ...	" ...	11 Sept. "	563	3·9	24·59	
Kit ...	" ...	28 Sept. "	662	3·7	27·43	
Brush ...	" ...	28 Sept. "	516	3·7	21·38	
Plover ...	" ...	3 July "	585	3·8	24·89	
Guinea ...	" ...	20 Feb. "	301	3·8	12·81	
Queenie ...	" ...	29 April "	473	3·9	20·6	
Frizzy ...	" ...	23 Aug. "	617	3·7	25·65	
Maggie ...	" ...	20 June "	381	3·8	16·21	
Laurel ...	Grade Shorthorn	10 Sept. "	693	3·6	27·8	
Empress ...	" ...	20 Nov. "	730	3·7	30·2	
Curly ...	" ...	10 Dec., 1899	622	3·8	26·48	
Trial ...	" ...	31 Oct., 1900	915	3·7	37·91	
Rusty ...	" ...	23 Dec. "	112	3·6	4·51	
Ginger ...	" ...	19 Dec. "	140	3·8	5·95	
Pansy ...	Grade Jersey	4 Dec. "	285	3·8	12·12	

The dairy herd grazed chiefly on natural pasture. During last two weeks of the period they were allowed daily one hour's grazing on portions of cultivation.

The Horse.

DISEASES AND DISORDERS OF THE ALIMENTARY SYSTEM.

BY WILMOT C. QUINNELL, M.R.C.V.S.L.

INDIGESTION OR DYSPEPSIA.

I. ACUTE DYSPEPSIA OR INDIGESTION WITH ENGORGEMENT.—This is caused by the distension of the stomach, either with solids or gases arising from fermentation of substances within the organ, generally resulting from the food being taken in too great quantity, from imperfect mastication, and from the ingestion of indigestible material, or food specially apt to undergo fermentative changes. Cooked food, brewers' grain, maize, musty hay, are especially liable to cause impaction. Wheat and barley are also likely to induce indigestion; whilst green foods, particularly when animals are first put upon them, or if given too abundantly, not only induce engorgement, but also undergo fermentation in the stomach, and thus give rise to tympanitis (hoven or blown).

Further, horses are more liable to indigestion after severe or prolonged exertion, especially if the food be difficult of digestion or in too large a quantity.

Symptoms.—The principal symptoms of acute dyspepsia are, there is great restlessness, pawing with the forefeet, especially the near foot; escape of flatus, distension of the abdomen, rigors, patchy sweats upon the body, and colicky pains.

Treatment.—Alætic purgative, is preferable to any other aperient, should be given at once in order to clear the stomach.

If the animal is in great pain, enemas and hot fomentations to the abdomen will be found of great service.

When the stomach is distended with gas, turpentine, oil, and carbonate of ammonia should be administered, care being taken to prevent the animal from throwing himself about, and thus preventing rupture of the stomach.

In cases where there is any difficulty in administering liquids, acetate of morphia may be injected hypodermically.

After treatment of this disease, as soon as the horse regains his appetite the diet should be at first of a laxative nature, and limited in amount.

II. CHRONIC DYSPEPSIA OR INDIGESTION WITHOUT ENGORGEMENT.—Chronic indigestion, like the acute form, is chiefly caused by dietetic errors, though these are not always apparent. The causes are very various, such as improper food; diseased teeth, causing improper mastication; debility, both constitutional and of the organs themselves, which in their turn induce changes in the gastric juices and in the movements of the stomach.

Symptoms.—The symptoms of this affection are very variable. The principal symptoms noticed in horses are, there is loss or capriciousness of appetite; the animal appetite becomes depraved—evinces a desire to eat filth; has a sour mouth and great thirst. He becomes hide-bound, and the coat stares; the bowels are irregular, the feces often coated with mucus, and there is a frequent escape of flatus by the anus. The urine is commonly of a dark colour, and thick. The horse is weak, and sweats easily on the slightest exertion.

Treatment.—The cause of the disorder should firstly be inquired into; a laxative almost invariably the first requisite. Careful dietary, avoid long fasts, vary food; allow water at reasonable intervals, or allow constant supply in stable. A lump of whiting and piece of rock salt in horse's rack.

Hard-worked horses often benefited by mixing an ounce of linseed oil with food daily. Followed by small doses (two drachms) of bicarbonate of soda, combined with vegetable tonics, such as gentian.

If the disease proceeds from imperfect mastication due to dental irregularities, these should at once be attended to.

HOW TO MAKE THE COLT STOP WHEN HIS RIDER FALLS OFF.

The best method of teaching a colt to stop when his rider falls off (says a writer in the *Natal Agricultural Journal*) is to put him into an easy-going canter. The breaker should keep the colt going round in a large circle to the left for some time, then draw the feet from the irons, quit the reins, and slip off at his near side, taking care in alighting to avoid being kicked. He must retain the coil of cord in the hand, which should not be less than ten or twelve yards in length, and whenever the colt gets to the end of the cord the sudden jerk turns him smartly round towards the breaker. The breaker should stand steady and pull the colt towards him, and whenever he comes up make much of him by fondling him about the ears and neck, speaking kindly to him at the same time. The cord should always be attached to the front cavesson ring and never to the bit, or the sudden jerk will lacerate the mouth of the colt and possibly pull him back over. The cord should never be rolled round the hand, but held firmly in the loose coil, because, were the trainer to fail in turning the colt, he might be dragged by the hand and severely injured. In slipping from the colt when he is going in a circle, the danger, however, is materially reduced. In ten or twelve lessons of this kind the colt will wait for his rider every time, and only those who have been accustomed to hounds can appreciate this easily-acquired and excellent qualification in a horse. Few riders can follow hounds without getting "spills"; and when hunters are not trained to stop, great inconvenience is entailed in securing them; therefore no hunter's tuition is complete when this branch of his training has been neglected.

BARLEY AS HORSE-FEED.

Mr. James Moffat, who has frequently contributed valuable articles to this *Journal* on the subject of horse-feeding, writes the following on feeding barley to horses:—

As much of the barley crop is unfit for malting owing to pinch and shrivel from drought, and a very low value is being obtained, I think your Department might take steps to break down any ignorant prejudice that may, and I think does, exist with horse proprietors against barley.

Some years ago maize happened to be scarce and high. I was contracting in Brisbane, and had a lot of horses. I put them on barley, and for many months they had no other grain. The drivers found their horses were more spirited and had better wind—this last was more readily observed in those suffering from "old man asthma," a sort of broken wind brought on through the bad system of feeding cut chaff with the grain—we never knew this in Scotland, where fodder was fed uncut and the horse could pick and leave undigestible matter in his rack. In North Africa the Arabs train their horses for ostrich-hunting on barley.

Last year an ignorant prejudice existed amongst horse proprietors obtaining feed supplies in Brisbane against the perished wheaten hay, and Mr. Tryon's report bears my contention out that in some instances a very superior hay for feed may be obtained by sterilisation of the ears by frost.

The case for barley is less contentious, as it has long been established as a good feed for horses when low prices allow it to be availed of—as at present.

By your *Journal* and your influence on the Press, you could do much to enlighten horse-owners as to the benefits of availing themselves of the low values at present ruling for barley, and thus do much to assist us farmers in Southern Queensland.

Poultry.

AGE OF PROFITABLE HENS.

A visit to a few poultry-yards, both in town and country, will reveal the fact that a vast number of useless old hens are kept, ranging from four years up to, in one case which came under our notice, eleven years of age. One of the most common complaints one hears from the owners is that "the hens are not laying very well just now." But visit the same places at the best laying season of the year, and still "the fowls are not laying very well just now." How can it be expected that such hoary-headed old tabby hens of eleven years of age will ever lay well? They outlived their usefulness years ago, and the owners are simply wasting money by keeping them. They metaphorically eat their heads off. Certainly, they cost next to nothing to keep on a farm, but in the towns and suburbs, where wheat is sold at 4s. per bushel and eggs are at times only worth 4d. to 6d. per dozen, a couple of dozen old hens are worse than worthless, for their eggs will never pay for their keep. The paying hens are those between one and three years old. It is then that they lay the greatest number of eggs, even up to 300 in the year. After this the egg production falls off, and the hens should be then sold for the table. Our experience is that Leghorn pullets begin to lay at six months old. When they begin, let them take the places of the old hens, and with proper food and attention there will always be a plentiful supply of eggs. To sum up briefly, keep no hens older than three years. At that age they will sell at from 3s. to 4s. per couple, and at that price will pay better than if they are kept in the vain hope that they will pay for their keep by their eggs.

THE POULTRY INDUSTRY.

In the returns of the Registrar-General, the number of poultry of all classes registered during the year 1900 is given at 550,609, and the egg production at 1,601,111 dozen. This return, however, is necessarily very incomplete, as it only includes the poultry of farmers and others who furnish agricultural returns, omitting consequently the large numbers kept in towns and in the suburbs. So with the egg. Hence it is fair to assume, as suggested in the Registrar's report, that the number of poultry is twice as great as that recorded. Thus there are probably quite one million fowls in the colony, worth approximately £100,000, and the egg production probably reached 3,000,000 dozen, worth £75,000. Thus £175,000 would fairly represent the value of the Queensland poultry industry.

The value of the wool produced in the colony was, in 1899, £3,390,779, or twenty times more than the value of the fowls and eggs together.

In Victoria the industry stands on a different footing. The gross estimated annual value of the wool for 1898-9 was £2,198,328. The value of poultry, eggs, &c., so far back as 1891, was £2,257,300, or 3 per cent. more than the annual income from wool. The total number of poultry in the colony was returned at 4,097,094 of all classes.

POULTRY IN VICTORIA.

Under the title "The Poultry Industry in Victoria," Mr. William Bateman has contributed a most valuable paper to the *Farmer and Grazier*. We regret that the exigencies of space preclude our printing the paper in its

entirety, but the following extract will doubtless be read with interest by all engaged in the rearing of poultry in Queensland:—

Before entering upon the outlets that exist for poultry for consumption, we propose to submit a few practical records with respect to the number of eggs from the best laying breeds, the cost of production, and realised results in the United Kingdom and the United States of America, and in doing so the strange coincidence is that the Victorian records, already submitted, are to a nicety borne out by the interesting and instructive particulars which will be given.

THE WHITE LEGHORN—HEAVY LAYERS.

Taking the United Kingdom and the United States of America, as a layer the White Leghorn gives the best returns: good flocks yielding during the season from 170 in the former country to as high as 194 eggs in the United States. Both these are, generally speaking, considered very high averages.

WINTER LAYERS THE MOST PROFITABLE, AND HOW TO BE SECURED.

The great secret of success in the laying division of the poultry is substituting the pullet for the hen, and thus securing eggs in winter when the price is high. An instance is given in the United Kingdom, where a flock of 600 White Leghorn hens and pullets are kept for winter laying, and 1,500 to 2,000 birds are reared every year. The Leghorns are bred with care for laying only, and 600 of them averaged one year 194 eggs per bird. In breeding for layers, the universal principle is only to hatch chickens from eggs of the selected layers, and in successive generations to match the best laying pullets of the progeny with the male birds, also the progeny of the best layers. In both the United Kingdom and the United States this principle is carried out.

The improvement of fowls, as well as in other animals, can only be accomplished by the system of carefully culling. It was by this system that the pioneer sheep-breeders of the States secured their prominent position as wool-producers. Exactly in the same way can readily be bred dairy cows to give 60 per cent. more butter than most dairymen are content with at the present period, and it follows that by a judicious method of culling the dairymen of these States could with ease produce from the same number of cows as are now milked 50 per cent. more butter annually. And similar attention will, from observation, have to be exercised by those engaged in the poultry industry before they can succeed in their undertakings.

COST OF FEEDING A FOWL, AND YEARLY NET PROFIT IN THE UNITED KINGDOM AND THE UNITED STATES.

The cost of feeding a fowl in both countries is put down by the highest authorities at 1d. to, in extreme cases, 1½d. per head per week; but as a general rule the cost of keeping a fowl all the year round is reckoned at about 5s., and the net profit varies from 5s. to 12s. per head, according to circumstances and management. In some cases the higher rate of profit is exceeded.

RESULT FROM ONE ACRE OF LAND AND 400 LAYING FOWLS.

The following authentic case is given:—It is the result from a poultry farm containing 1 acre of land, with 400 White Leghorn fowls, near Boston, in the United States of America, which will be of very great interest.

The Case to be Submitted.—Winter Layers: The profit per bird is reckoned upon the basis of 175 eggs each, averaging, for the most part of the season, 2 oz., sold at the average price, during a period of six years, of 13½d. per dozen—varying from 7½d. to 1s. 10d.—at which price the eggs were purchased by the grocers as strictly fresh eggs. This number of eggs was actually attained, and prices stated were secured. The food cost 5s. 5¼d. each bird. The fowls, after one year's laying only, were, for the most part, sold at 2s. each. The net profit returned was 12s. 11½d. per fowl! However, as no charge was made either for labour or rent, for capital invested, the account would stand thus:—

Net return from 400 fowls, at 12s. 11½d., £259 3s. 4d., as against labour and interest on capital. Taking the capital cost of a fowl at 2s. per head, the

net profit return is more than six times the value of the fowl. This is truly a marvellous result.

VICTORIAN RECORDS.

Having shown the cost of feeding laying fowls and the eggs returns, as applicable to the United Kingdom and the United States of America, the most interesting part of this address will be to show what are the same particulars from a Victorian standpoint, which have been carefully compiled from a reliable source. The case to be introduced is the cost of keeping twelve White Leghorn pullets from the 1st April, 1899, to 31st March, 1900, the egg return, and the price realised for the sale of the eggs, so that a comparison may be made between the three different countries; and it is to be hoped that the result of this comparison will act as an incentive to induce people to develop the poultry industry, as the industry is a profitable, safe, and assured one.

RETURNS FROM TWELVE WHITE LEGHORN PULLETS.

Some of the pullets commenced laying early in the month of March, at five months old, others at six months to seven months. The pullets at six and seven months laid, at the commencement, much larger eggs than those at five months. The size of the eggs gradually increased in weight, and for part of the season a large proportion of the eggs weighed $2\frac{3}{16}$ oz. on the average, and were very even in weight. The twelve pullets, during the whole laying season—about eight months—produced a total of 2,064 eggs, or 172 each.

The average weight of these eggs all through the season was nearly 2 oz. In these computations it is not the weight of single eggs or an average weight for a short period that must be accepted as a guide, but the weight of eggs laid for the season from the laying hens. The living weight of the pullets was an average of 4 lb. each at the end of the season.

To summarise the case, the result would be:—Twelve pullets, weighing 48 lb., producing, during the season, 2,064 eggs, weighing 248 lb. This is over five times their own weight in eggs! The prices realised for the eggs varied from 1s. 9d. to 8d. per dozen from local grocers. The following particulars will give their money value:—

RESULTS FROM TWELVE PULLETS DURING ONE SEASON.

	s.	d.	£	s.	d.
5 dozen during the first three months average at	1	9	0	8	9
3 " " " two " "	1	2	0	3	6
$6\frac{1}{3}$ " " " four " "	0	8	0	4	3
$14\frac{1}{3}$ dozen—172 eggs each pullet—equal to "	1	$1\frac{3}{4}$	0	16	6
Deduct cost of food per pullet ...	...	...	0	5	0
Net egg return per pullet ...	...	...	0	11	6

COMPARISONS OF DIFFERENT COUNTRIES.

The comparison is taken between the most favourable records in the United Kingdom and the United States of America, namely:—The former, at 12s. for the yearly net gain on the eggs produced from one fowl; and 11s. in the United States of America. Although 12s. 11½d. is returned as the egg profit from one fowl in the United States, yet this includes the sale of the fowl at 2s. at the end of the laying season, which, in the comparison, must be deducted, so that the three returns stand thus:—

YEARLY NET EGG RETURN FROM ONE FOWL.

	s.	d.
In the United Kingdom	12	0
In the United States of America	11	0
In Victoria	11	6

The evenness of these three returns worked out from three distinct sets of facts, is in itself sufficient to prove the value of the egg-producing industry. The average price realised for the eggs, in the United States of America, from 400 White Leghorn fowls, before cited, was $13\frac{1}{2}$ d. per dozen; while, strange to chronicle, the price realised in Victoria for the eggs from the twelve White Leghorn fowls was $13\frac{3}{4}$ d. per dozen.

VICTORIA POSSESSING ADVANTAGES AS A PRODUCING COUNTRY FOR EXPORT.

The great advantages Victoria possesses are grounded on the fact that our best producing season for poultry and eggs is the worst in the consuming countries to which we export; and, therefore, our surplus products reach these markets at periods when their supply is the smallest and dearest.

EGGS: WHEN AND HOW TO PRODUCE.

The first step to take is to produce pullets to commence laying in April for the local demand; and after winter, when the eggs have increased in size, they are suitable for the London market.

Pullets, after laying two seasons, should be at once turned into money, as the egg returns decrease in number as the pullets get older, and are not so remunerative. Experience confirms this in all cases where correct records have been kept, and, besides, the laying season of all fowls except pullets is too late to take advantage of the high prices ruling in the local market for the autumn and winter months. It is, however, necessary to keep pullets for the second season, but no longer. First, for a supply of eggs for sitting; and, second, after that supply is met, the eggs are available for the London requirements when high prices are ruling. As the fowl gets older the number of eggs in the season falls off considerably.

COMPARATIVE STATEMENTS INDISPUTABLE.

The most convincing of all cases are really practical tests, based upon reliable comparison, as these are indisputable. This is the crucial test of all problems.

LITTLE CAPITAL NEEDED FOR EGG-PRODUCING.

The little capital that is needed to successfully accomplish all we have declared can be done, is to the inexperienced and superficial mind an unsolved mystery; and to bring about such unparalleled and marvellous results as will be introduced, will be a still greater mystery.

We will show what little capital is needed to embark in the poultry industry; and, moreover, instance what little capital is required for a grand national system of settling the unemployed and their helpless families on the land, and rearing them into an industrial position of helping themselves, and becoming creators of their own wealth by working for themselves and not for others, and leading a prosperous and happy life, instead of being, as at present, in many cases, helpless dependents upon the State for sustenance. This is a degenerated and degrading state of social affairs; but, nevertheless, true to the letter.

The following simple table will show the case clearly, and prove what an insignificant part working capital takes as against land and labour; and how truly the remarks of our deepest thinkers and modern economists come home to all thoughtful people, namely:—That land should be provided for the workers, all those who are able and willing to husband it, and not allowed to remain undeveloped in the hands of the moneyed men and landjobbers; because the latter course clogs the wheels of progress and handicaps production; that is, makes production more costly, by violating the first principle of economy.

That principle is to work the land by direct labour, and not, as at present, by hired labour:—

CAPITAL INVESTED.

TABLE SHOWING CAPITAL INVESTED IN A COW, PIG, SHEEP, AND FOWL, AND THE GROSS ANNUAL RETURN SAME.

Cow.	Pig.	Sheep.	Fowl.	Total Amount Invested.
£ s. d. 7 0 0	£ s. d. 3 0 0	£ s. d. 0 8 0	£ s. d. 0 2 0	£ s. d. 10 10 0

THE GROSS ANNUAL RETURN FROM SAME, AND PER CENT. RETURN ON CAPITAL INVESTED.

Cow—Butter.	Pig—Progeny.	Sheep—Wool.	Fowl—Season's Eggs.	Total Annual Return on the Capital Invested.
£ s. d. 5 16 8	£ s. d. 34 0 0	£ s. d. 0 4 0	£ s. d. 0 16 6	£ s. d. 40 17 2
Per cent. 84	Per cent. 1·133	Per cent. 50	Per cent. 825	Per cent. 389

THE FOWL AND THE SHEEP.

Having shown the gross yearly return, for comparative purposes, of the dairy cow, pig, sheep, and laying fowl, we do not propose on this occasion to go into the cost of producing either 1 lb. of factory-made butter, a pig, or 1 lb. of greasy wool; inasmuch as the records submitted are conclusive that as a convenient occupation the production of the right class of egg is an interesting and most conclusive one—equally as important to produce the right class of egg as it is to breed the right class of cow for butter, or the right class of sheep for meat and wool, and the poultry industry is one that is easily managed, considering that from 1 acre of poor land of suitable qualifications a return, after paying for fowls' food, of 11s. per fowl, or over £200 a year, can be made, such a return as against capital and labour is marvellous; and to say that the gross egg return from one fowl, for twelve months, is more than the wool value from four ordinary sheep in Victoria is still more startling.

BLACK HAMBURGHS.

By HERBERT SIMPSON, JUNR.

Very little notice seems to be taken of this breed in Queensland, though it is coming into great prominence in New South Wales. Some poultrymen will tell you that the Hamburgs lay small eggs, but if you will take a little trouble, you will find out that nine out of ten of these poultrymen have never kept Hamburgs, but they have heard it from so-and-so. Now I am confident that where small eggs are produced, inbreeding is the cause, for show points or some whim of the fancier. I have myself eggs from Black Hamburg hens that will compare favourably with either White or Brown Leghorns. They are constant foragers, and will wander great distances in search of food, outstripping the Leghorns in this respect. They are also great consumers of green food, and where they have the run of a good paddock, one feed per day, before they go to roost, is sufficient. Another thing in their favour is their prolific qualities, as, often, every fertile egg will hatch. Not so with the Leghorns, which I have proved to my cost, for out of several high-priced settings of Leghorn eggs, procured from New South Wales last season, I hatched only 7 chickens, while out of one setting of Hamburgs from the same farm 10 out of 12 hatched, and under the same treatment I reared 4 Leghorns and 9 Hamburgs. Out of 72 fertile eggs placed in the incubator (40 Brown Leghorns and 32 Black Hamburgs) there were hatched 20 Brown Leghorns and

29 Black Hamburgs, which left 19 Brown Leghorn eggs and 4 Black Hamburg eggs dead in the shell. Hens gave about the same results. Out of the above I reared 15 Brown Leghorns and 26 Black Hamburgs. These results are largely due to the greater amount of green food consumed by the Hamburgs. What will feed 3 Leghorns will feed 5 Hamburgs, which is a great consideration where a large flock is concerned. I consider a Hamburg hen will pay to keep for four years, and I know of individual hens—some eight years old—which are still laying constantly. Add to this the beautiful shiny, green-black plumage, rose comb, white ear-lobes, and stately carriage of these birds, and, whether you are a fancier or not, you cannot help but be an admirer; and I trust the time will soon come when this useful breed will be given the place in Queensland that it rightly deserves, and, if breeders will give it the encouragement it needs, I am confident it will win a name for itself by sheer merit.

PRESERVED EGGS.

Last July, Mr. James Trow, of Rocklea, placed a quantity of eggs in a solution of salt and lime. In December they were opened and found to be in perfect condition. They were supplied as preserved eggs to Mr. Trow's customers, and the general opinion was that there was no appreciable difference between them and newly-laid eggs. Half-a-dozen, which were left at this office, proved to be perfectly sweet and fresh. Since eggs often fall as low as 4d. per dozen and sometimes rise as high as 2s., it would surely be good policy on the part of those who keep poultry to preserve them in quantities when cheap, and wait for the rising market. Mr. Trow will be pleased to give any information required on the subject.

TICKS AS POULTRY FOOD.

Mr. J. Bunnage, of Gracemere, supplies the following information concerning fowls as destroyers of the cattle ticks. We should be glad to hear if any of our readers has had a similar experience. Mr. Bunnage also gives a simple and harmless remedy for curing crop-bound fowls:—

In reading the poultry notes for this month in your *Journal*, I notice that reference is made to a bird called "the Buffalo Pecker" as a bird very destructive to ticks. I think we have in our domestic fowls some birds that would do much to help to reduce the tick plague, if they were only given a fair chance. I live near a reserve, and it is a very common thing to see the fowls following the cattle about, picking the ticks off them as high as they can reach; and once the cattle understand what the fowls are after, they offer no resistance; in fact, it is quite common to see the cattle standing or lying under a tree chewing the cud, and the fowls making the most of the time clearing off the larger ticks.

Now my fowls do not do this because they are starved, but because they like the blood in the tick.

I think a good plan would be to have a small movable poultry-house with about twenty fowls placed near every cattle camp of any size within reasonable distance of the station. They would only require to be fed once a day, and that would be in the evening, when the eggs could be gathered at the same time, which would defray expenses of feed, housing, and attention; and the squatter or dairyman would have the pleasure of knowing there was a considerable diminution in the number of ticks every night. I should say that the lighter breeds—such as Leghorns, Minorcas, Andalusians, and Game—would be the best for this purpose, being swift on the wing, and thus being able to get away from any of their enemies much better than the heavier breeds; also, being more active, they would follow the cattle about more, and being greater layers—Games excepted—they would require more animal food for egg production, which means that they would eat more ticks.

The Orchard.

CAPRIFICATION OF FIGS.

The caprification or cross-pollenisation of figs is described in a recent number of the *Californian Fruitgrower*. The work in Smyrna is performed by women and children, who gather the profichi and suspend them in the branches of the Smyrna tree.

In the Meander orchards it is customary to string the hard profichi on the ends of rushes, which are pushed horizontally through the sides of the fig; if the profichi are plentiful, two are strung on each end of the rush, which is then thrown up into the Smyrna tree and caught among the branches. The fig wasp, on emerging from the profichi, enters the figs nearest to hand, not discerning any external difference between the young Smyrna figs and the young mammoni, which it would enter if still in the caprifig tree. But, once inside, the fig wasp discovers that something is wrong, for, instead of finding short-styled gall flowers in which it could lay its eggs, there are only female flowers with long styles, which are entirely unfitted to receive the eggs; the insect is unable to escape, and, in darting about in vain efforts to find some gall flowers, the pollen with which it was so freely dusted in emerging from the profichi is rubbed into the receptive stigmas of the female flowers. The little wasp finally dies in the fig without having been able to provide for the production of its kind, and, on cutting open a Smyrna fig shortly after caprification, one can usually find the dead insect.

THE EXPORT AND PACKING OF CITRUS FRUITS.

(Read by Mr. H. GODDARD at the monthly meeting of the Palmwoods Progressive and Industrial Association, Saturday, 29th December, 1900.)

Owing to the large yearly increase in acreage of citrus trees, and the greater bearing capacity of those already fruiting, and to the consequent glut and low prices in the colonial markets, the question naturally arises, How are we to maintain a fair price for our produce? I think it must be obvious to everyone that export, to a certain extent, is a necessity, and hence a discussion on the best means of establishing an export trade to the best advantage will not, I think, be out of place. I will then bring forward a few facts and figures which might afford a basis to work upon.

In the first place, an export trade should be carried out with a system of a good, sound, and hearty co-operation something after this style: If twenty members of the Palmwoods Progressive Association would guarantee fifty cases for export, that would make a total of 1,000 cases, which, if packed to be sent away at the same time, would ensure a special freight rate both by rail and sea.

In reference to packing materials, such as cases and wrapping paper, these could be bought in one lot at wholesale rates, each member taking the quantity he required. By this means a saving would be effected, which would naturally help to minimise the cost of packing. By exporting their fruit, growers would benefit in two ways: They would obtain a good price for that sent away and would thus relieve the colonial markets, with the result that better prices would be obtained locally. It would be well, also, to consider what market to consign to, and also the method of disposal of the consignments. I should be disposed to favour the London market as offering a much wider scope than that of Vancouver.

As regards the manner of disposal, there are two methods which commend themselves as satisfactory: Either the fruit should be consigned to be sold on commission by reliable agents, or exporters might place themselves in communication with some large fruit firm in London who would give a certain price,

based on the value of samples which would have to be despatched very early in the season to enable them to fix a price. Now, with regard to packing, the present case is utterly unsuitable for the English markets. In the first instance, take the cost. As you all know, the cost of packing is a dead loss; so that the first business is to minimise that loss as much as possible without interfering with the effectiveness of the work. The cost at present—that is, 4d., besides the time of making and nails, added to freight and commission—is, I think, excessive for marketing an article of a market value of 2s. 6d. or less. It does not leave much of a margin for profit. The second consideration is this: The present style of case entails much tedious packing which, with a larger bulk of fruit to handle every year, should be reduced as much as possible. The case I should suggest would be one which would lessen as much as possible the cost and time devoted to packing.

The Spaniards send their oranges to the English market in two grades, known as 420's and 714's, which is the number respectively in each case, but, owing to the longer time the Queensland oranges would have to lie together, it would not be wise to pack so large a quantity in a single case, hence a medium-sized case would answer better. The case to hold the first grade oranges should be an oblong one which, when parted in the middle, would form two squares to hold five oranges square, thus making a total for the case of 250. The second grade should be made to hold six oranges lengthwise and five deep, which would give a total for the case of 360. These to be known on the English market as 250's and 360's respectively.

Such cases, I think, would greatly lessen the cost of packing and transport, and it should not cost more than 6d. each to take 1,000. The result would, therefore, be a saving of 8d. in the cost of packing five of the present-sized cases and two of the suggested ones, besides the time saved in the making of the different cases.

In conclusion, with regard to the keeping quality of mandarins—that has been proved to be good when care is exercised in packing. But, as they are yearly decreasing in price, it would be as well to export them also but they should be treated as a luxury, and packed as such—not sent in the same way as they are sent to Brisbane, which would give the English people an idea they are common fruit, and they would fix their price accordingly. They should be packed in first-class style, and so would command a price which would amply repay the extra cost of wrapping materials and labour. They should be packed in a box made to take layers of a dozen each, the box to hold two dozen of the first grade and eighteen of the second grade in a layer, the box thus holding three dozen. All the mandarins should be wrapped in the ordinary wrapping paper with the top layer wrapped in tin foil; the box should also have an edging of lace paper with a small label bearing the words “Queensland mandarins,” with the initials of the grower in the centre. I think the necessary materials could be bought through this association, the chairman and members of the committee acting for the whole of the members.

I feel sure if some such scheme were carried out in a hearty manner, it would result in a mutual benefit to the members of the Palmwoods Progressive Association and consequently to Palmwoods at large.

PROTECTION OF TREES AGAINST ANTS.

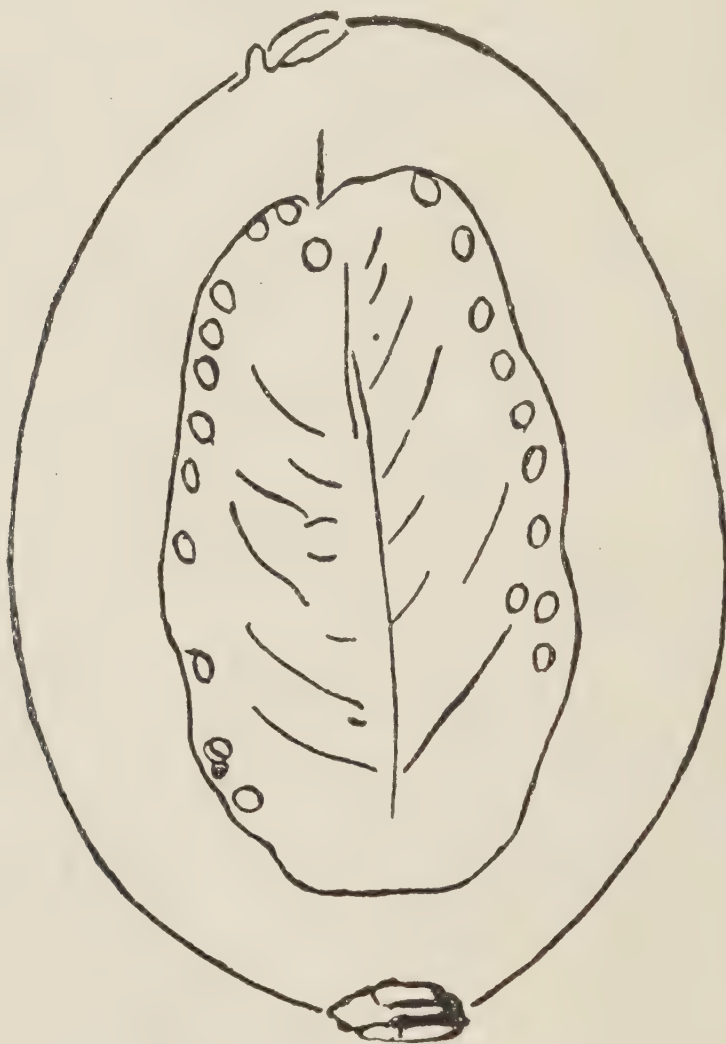
Many a freshly grafted bud on an orange-tree has been destroyed by ants, which, with some other insects, are the bane of budders. An American fruit-grower has discovered a plan by which he says ants may be kept in their place. His plan is to saturate wool strings with castor oil, and tie these tightly round the trunk or limbs of the trees which have been budded. The ants go up as far as the strings, but none were seen to cross one of the bits of wool. Cotton strings will not do, and experiments with other oil have not been successful. Woollen yarn must be used. The same treatment is effectual on other trees.

EXPORT OF FRUIT.

There is evidently a strong desire on the part of British steamship owners to secure cargoes of Australian fruit for the London and Liverpool markets. Mr. Alfred Holt, a large steamship owner of Liverpool, has notified the Department of Agriculture of Victoria that he proposes sending three of his vessels to Melbourne—the first, the “Sarpedon,” to leave Melbourne in February; the next, the “Hector,” will leave in March; and the third, the “Orestes” in April. All these ships are fitted up with the dry-air apparatus. The freight from Melbourne will be 75s. per ton of 40 cubic feet. The owners of the White Star line are also entering the field, as there is likely to be a very large fruit crop this season in Victoria.

A FINE GUAVA (*PSIDIUM*).

Appended is an outline drawing of a variety of guava—*Psidium guava Radd*—which has been found growing in the suburbs of Port of Spain. It is known here as the Red or Cayenne guava, and is, for flavour and size, a long way superior to the ordinary wild growth—



The fruit is oval in shape, and—in the average size specimen before us—is $3\frac{5}{8}$ inches in its longest and $2\frac{5}{8}$ in its shortest diameter. It has fewer seeds than the ordinary kinds, and is filled with semi-solid red pulp in its interior. For making the celebrated guava jelly of the West Indies, it is far more desirable than the smaller kinds, and deserves to be widely cultivated. The weight of an average specimen is 0.35 lb., thus taking seldom more than three fruit to the pound weight.—*Bulletin of the Botanical Department of Trinidad.*

Apiculture.

CONVERTING COMBS INTO WAX.

Wax is a bee product that is wasted to a very great extent. Pieces of old comb, spare combs in frames, and, in old-fashioned apiaries, combed skeps are allowed to lie about until the wax moth has simply ruined all. Wax realises 1s. 4d. to 2s. per lb., according to quality and the manner in which it is prepared for sale.

I believe that the waste of wax is brought about through thoughtlessness, or probably more through a strong objection to the trouble that is inseparable from wax-extracting.

Old combs yield a small proportion of wax, because the cocoons, when the combs are subjected to heat, absorb a certain quantity. The combs in a straw skep might not yield 1 lb. of wax, but, supposing that they did yield that quantity on an average, it is certain much is wasted that might be marketed.

For the benefit of bee-keepers who are not conversant with the best methods of extracting wax from old combs, I give a few instructions; but I must state that the less oven heat we use to both wax and honey, the better both will be. A simple arrangement is to obtain a deep bowl, cover the bottom to the depth of a few inches with water, over the top tie a piece of muslin or canvas, press it down to a cup-like shape, and then in the depression thus formed place the scraps of comb, and set the bowl in the oven. The wax will quickly melt and fall into the water below as fast as the bulk of refuse combs lessens; place on more, and in this manner a good quantity will soon be free from wax.

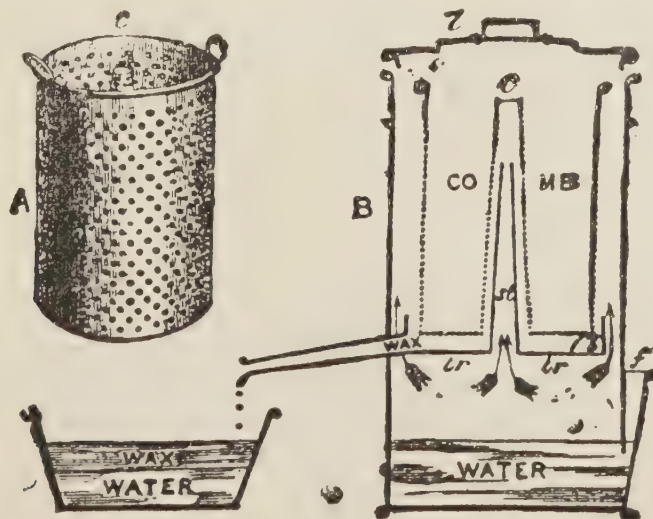
"GERSTER" WAX-EXTRACTOR.

When all wax has passed through the strainer, take out the bowl and let it stand till the water is cold and the wax has formed a cake upon the surface of the water. The cake thus obtained will be quite pure, as the refuse will have been retained upon the strainer, while minute portions that have passed through will fall to the bottom of the water. Re-melt and model the wax of any desired form.

ANOTHER SIMPLE PLAN,

and one very generally used by old bee-keepers, is to place all combs, pressed together to lessen the bulk, in a bag of canvas cloth. Drop this into a good-sized boiler, and weigh it down, so that nothing appears to the eye but water. Bring the water to the boiling point gradually, and allow it to simmer gently for some time, and all the wax will rise and float upon the water. Deal with this cake as advised with that in a bowl placed in the oven.

These are inexpensive methods with home-made appliances, but, if a wax-extractor is desired, there is not one that excels the Gerster in its improved form, as shown in the accompanying illustration—



This extractor consists of a perforated tin or zinc cylinder to receive the combs, and it is placed inside a steamer, where steam has access to it, and melts the wax. As the wax melts it passes through the perforations and falls into the tray, from which it runs by a spout into a tin or bowl set to receive it. The whole method of working the machine is clearly shown in the illustration.

Cakes, large and small, plain and ornamental, have been the outcome of melting operations, but none in a really marketable form. One bee-keeper who has taken some pains in preparing wax for sale has devised trays cut into large or small squares by means of slides. These are so placed that definite weights result, and a contrivance of this nature must be welcomed generally, as the retail shopkeeper will naturally buy 2-oz. or $\frac{1}{4}$ -lb. blocks in preference to lumps weighing 1 lb. or several pounds from which he must cut large and small pieces to satisfy the wants of his customers.—“Bee,” in the *Farmer and Stockbreeder*.

HOW TO REAR QUEENS.

In the January number of the *Journal* we described the process of rearing queens as practised by Mr. G. M. Doolittle, apiculturist, of Chicago. The illustrations herewith show how the artificial queen cells, fastened to a stick, are crowded between the side bars to a frame of comb previously cut so that

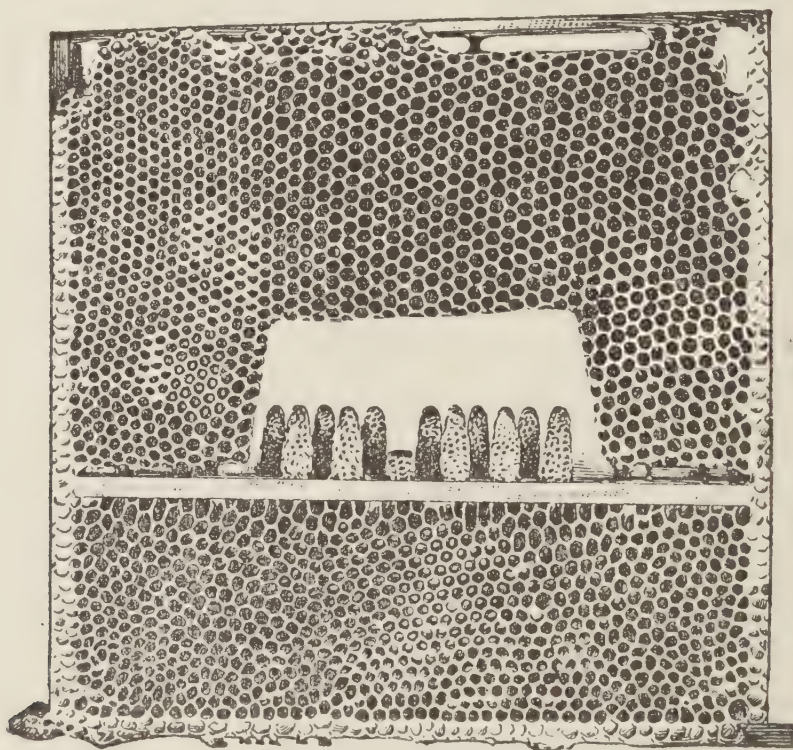


FIG. 1.—FRAME SHOWING HOW THE STICK OF QUEEN CUPS IS FITTED INTO IT, AND HOW THE CELLS LOOK AFTER BEING BUILT FROM THE CUPS; $\frac{1}{4}$ NATURAL SIZE.

the cells come in the centre of the comb, the ends of the stick being slipped through a slot cut in the comb for them. Fig. 1 shows the frame of comb with the embryo queen cells attached, and Fig. 2 the artificial cells fixed to the stick.

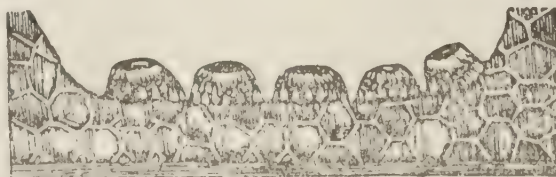
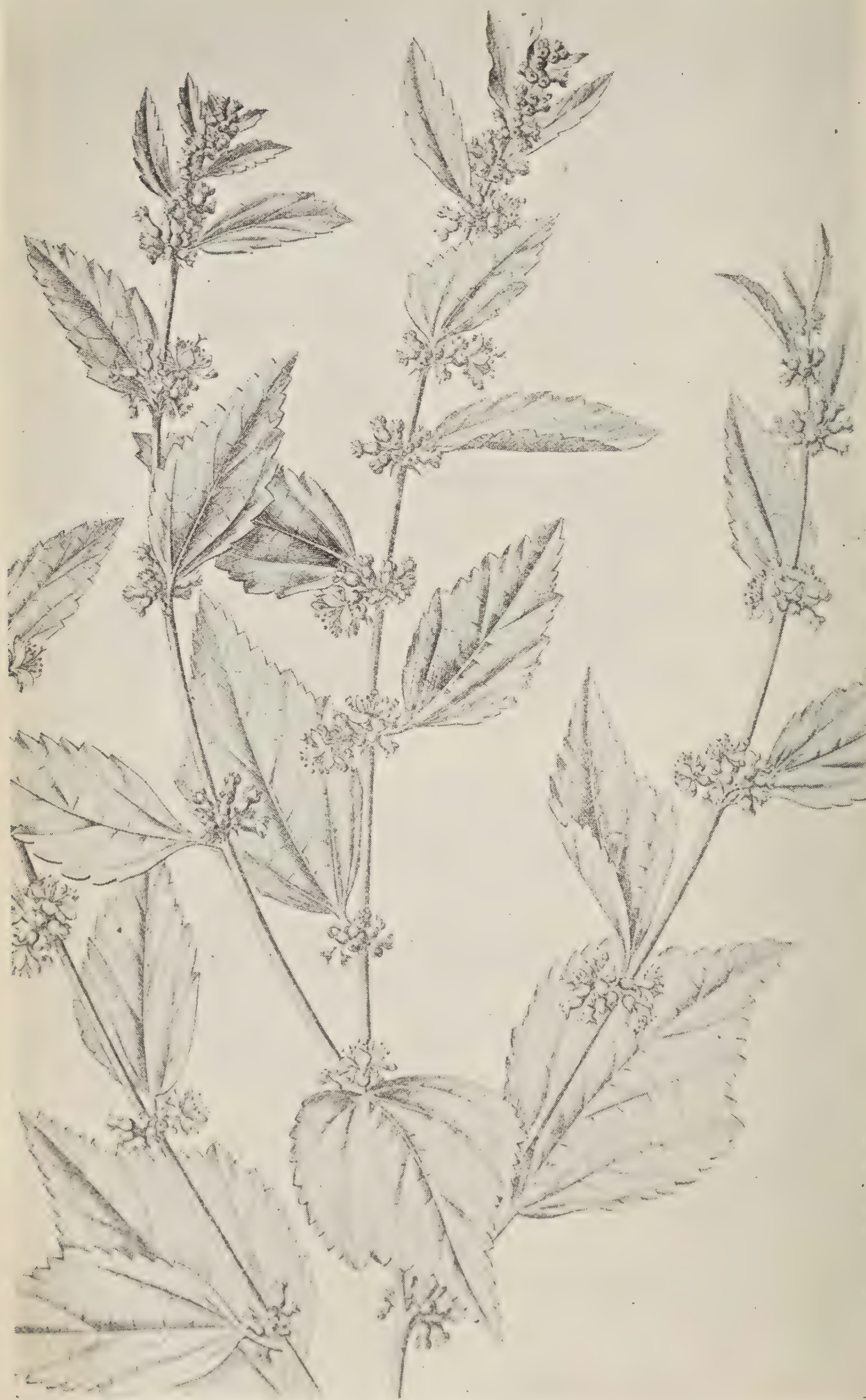


FIG. 2.—COMB WITH QUEEN CUPS.



TRIUMFETTA RHOMBOIDEA—Jacq.

Botany.

NOXIOUS WEEDS.

By F. MANSON BAILEY, F.L.S.
Colonial Botanist.

CHINESE BURR (*TRIUMFETTA RHOMBOIDEA*, JACQ).

PLATE IX.

This soft-wooded shrub of the order Tiliaceæ attains the height of 5 or more feet on the scrub lands of the tropical parts of Queensland, and is one of the most troublesome weeds with which the cultivator of the soil in those parts has to contend with. The accompanying illustration gives a good idea of the plant, and renders further description needless, except it may be to say that the flowers are yellow. This pest, in one or other of its forms, is found in the East Indies, Malay Islands, China, Tropical Africa, and the West Indies. In certain stages of its growth it may be mistaken for two other burr plants which are also common in the North—viz., *Triumfetta nigricans*, Bail., and *Urena lobata*, Linn. The first of these, however, has large black burrs; and the latter, which belongs to the order Malvaceæ, has pink flowers.

HAIL PREVENTION AND RAIN PRECIPITATION.

Captain W. D. G. Worcester, of the R.M.S. "India," when last in Sydney, expressed surprise that nothing had as yet been done in Australia in the direction of experimenting with a view to causing the precipitation of rain. He stated that this effect could be produced with absolute certainty, in presence of a nimbus cloud, by suddenly reducing the temperature within the cloud area. He suggested the use of a shell charged with liquid air and fitted with a time fuse, set to cause the shell to burst in or near the cloud. The liberated liquid air would at once change the moisture in the cloud into snow, which would as it descended to warmer strata change into sleet and reach the earth in the form of rain. This result, he declares, is absolutely certain.

What will strike most people who give the matter any serious thought is that the descent of the shell has to be accounted with. Up to the present packages containing liquid air have had to be strong enough to resist a pressure of 350 lb. persquare inch; 25 lb. of the air are said to be equal in cold production to 1 ton of ice. A shell strong enough to resist such a pressure must needs be very heavy, and should it happen to fall, say, in a cowyard, amongst a flock of sheep, or in the midst of any aggregation of human beings, the results would be disastrous if it had failed to burst, and still very serious if the fragments came down upon defenceless heads.

Fortunately, within recent months, liquid air has been manufactured which may be carried in vessels fitted to withstand 10 lb. pressure, and hence a shell charged with the substance could be constructed of common block tin, thus obviating all danger from the falling fragments. But why fire these shells into the air, and why cause them to burst? They might be attached to captive balloons, and might be fitted with a base which would be blown out by a small detonator fired by the fuse. Thus the liquid air would be liberated without any dangerous bursting of the shell. The balloon, of course, would be recovered in the usual way. Experiments such as these could be carried out at small expense, and if successful would prove of much benefit to the community.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND—No. 5.

DISBUDDING.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

On my arrival in this State, and after seeing the coffee estates and conversing with the growers, I was frequently asked to explain what was the matter with some patches of coffee which the owners considered sick. In some places the unusual and obviously unnatural shape and condition of the trees were put down to some new form of coffee disease. The theories were numerous regarding these alarming symptoms, and more than one tree was dug out to see if anything unusual could be found in its root growth.

The trees were long and thin, some 8 to 10 feet high; they had a good lower part, consisting of from six to eight pairs of primaries well covered with wood, and an apparently healthy tuft of green branches at the top, but the middle of the stem was, for 2 or 3 feet, either woefully naked or sparsely covered with a bristling assortment of dead primaries. The middle branches had died out, I was informed, and nothing could be found wrong with the roots by anyone. This unfortunate state of the trees was due to no disease, but purely to natural causes. It was not experienced in other countries because coffee is, firstly, not allowed to get into such a state, and, secondly, would not generally do so except under very favourable conditions of growth. The reason of this dying back of the apparently middle primaries began in or about the third year of the plant's growth, when the first crop was borne. Coffee not bearing for the first three years or so, the lower six or eight primaries were enabled to make secondary growth as well as to mature and establish themselves, while the upper primaries had not generally done either by the time of the first blossom making its appearance. The tree blossoming heavily all over—too heavily, in fact, owing to the rich soil and forcing climate—the lower primaries blossomed all through, with their secondaries to a certain extent also. The upper primaries blossomed to their very tips as far as they were old enough to bear, and at the extreme top of the tree a pair or two of young primaries, only an inch or two long, were not old enough to do anything. In the course of producing and ripening the fruit from this blossom, the lower branches, owing to their maturity, age, and support from secondaries, were able to do so satisfactorily. The very little primaries at the extreme top, having no crop, drew their share of sap and continued to grow; but the upper primaries of the young tree had not only to support themselves, but bear and ripen their crop as well, and, bearing over every inch of their length, they were unable to meet this demand upon them.

Their share of sap was absorbed in filling the berries. In some instances they managed to ripen their crop and then died; in some they only ripened the crop on the matured portion of their length; in others the tips of the primaries died back. In some instances the effect was greater, in some less; but the result was in all cases that they bore their progeny at the expense of their own constitutions, and often at the cost of their very lives. When they lived it was as whippy, long, thin sticks that were bark-bound and entirely without secondary growth upon them; and the young primaries just above, that were too young to blossom, together with a few more that grew in the course of the year, soon outgrew the bearing ones in length and girth. In this way a gap was at once established of from 1 to 2 feet. The next year much the same thing happened again, the result being a widening of the gap, and resulted a growth of tree not only unsightly and useless, but at the mercy of wind and weather.

Trees that were topped in time did not suffer to the same extent. In demonstrating this point in the field, I seldom had any difficulty in finding examples to hand of trees in various stages of this form of over-bearing, and I would suggest to coffee-growing readers to look carefully round their estates and notice any such tendency.

This is a matter easily remedied if taken in time, but if in a well-protected locality is very apt to be unnoticed until the damage is done. The remedy for this state of the tree is to cut the stem right back to the top of the healthy primaries—a place generally seen at a glance—for the upper part is of no use, and a new sucker can be raised from the stem where cut, which, if topped in due time at the right height, will, in a few years, bring the tree into shape again. Topping back a young tree boldly, even down to 3 feet or so, when any tendency to become bark-bound in the upper primaries is observed, will also often save it, but prevention is better than cure.

To prevent the above-mentioned state of affairs it is necessary to disbud. The disbudding should be done by pulling or rubbing off the very young beans a week to three weeks (not more than a month) after the blossoming. It is of no use rubbing off the flower-buds, as at that time the tree is in a state of conception, and the effect is merely to force out a succession of buds in the same eyes; nor is it any advantage to wait until the berries are half or partly grown, nor, as some suggest, to wait until the tree shows, by turning sickly or yellow, that it cannot carry the crop, for by that time the harm is mostly done.

Disbudding is only necessary from primaries, and the green or immature part of those, which is usually about half their length. The mature wood is able to carry its crop without detriment. As a matter of fact, the green tip of the young primary should not be allowed to put out secondaries either. Disbudding, again, is, as a rule, only necessary once in the life of a coffee plant, and is not an annual work, for, once the primaries have secondaries to support them and to draw sap, over-bearing on the green end of the primaries seldom occurs.

Generally it is in the third year of the plant's life that this is required, but occasionally a little attention may be necessary in the second year, and sometimes in the fourth, but seldom more than on the one occasion.

Disbudding is required from the primaries whenever, and only when, they attempt to bear on immature or green wood. It is not necessary if the primary has secondaries upon it, and it is not necessary to disbud secondaries or any other form of branch.

A secondary or tertiary can be replaced from the same eye if by any chance it should die from over-bearing (which very seldom happens), but a primary never.

This disbudding may perhaps be considered an expensive work because of the time it takes to do, but, as I have already said, it has only to be done once (as a rule) in the life of a plant, and the labour is very soon repaid by the subsequent cropping of the tree. One or two growers objected to the apparent loss of crop occasioned by the pulling off of the berries on the green tips as advocated by me, but I regret to say that their estates suffered considerably in consequence, and no advantage was gained, as the primaries were not only unable to ripen any crop on the tips and died back, but did not even fill out the crop properly on the matured portion of their primaries.

The disadvantages of not disbudding have been amply shown, I think. The necessity and advantages of disbudding lie in an increase instead of in a decrease of crop in taking the first two crops together, because of the secondaries that the disbudding encourages and which come into bearing in the second year, and the production of sturdy and healthy trees that bear an even crop annually. Indeed, the value of the crop removed as well as the cost of removing it is often paid for in the first year by the size, weight, and density of the crop left on, which otherwise often does not ripen at all.

Reference to this matter is seldom found in any books of writers on coffee culture, because in most countries it is not necessary, or so seldom happens as not to be considered generally necessary; but here, in Queensland, the very favourable conditions for the culture of the staple might prove the very cause of its undoing.

It has been the cause in so many instances of failures, or rather, perhaps, the want of success of coffee-growers in this colony, that I am of opinion that it is worthy of special note.

NATURAL COFFEE PLANTING.

The *Produce Markets Review* of 3rd December says:—

“A great change has passed over gardening opinion in this country with regard to the excessive pruning of fruit trees and flowering bushes which was the rule a few years ago. It has occurred to many that Nature probably knows what it is about better than rule-of-thumb gardeners, and that the diseases of cultivated plants, such as the vine, the coffee bush, and the sugar-cane, are due to long-continued infractions of natural laws. With the vine, grafting on American stocks that had not been tortured for generations by over-pruning has proved a cure for disease. Our fruit-growers in this country are going in for ‘extension’ training, tempered by root-pruning in extreme cases. For the sugar-cane a return to Nature is being made by its growth from seed instead of from slips or buds. English gardens are having their entire aspect altered by leaving their roses unpruned, so that ‘blossoming like a rose’ is no longer an abstract Biblical simile. The over-plucking and unnatural culture of tea, especially in Ceylon, inspires great uneasiness among those who have studied such matters, and have seen the cultivation of coffee practically driven out of that island. It is satisfactory to see that the Southern Indian Planters’ Association, at its meeting in August last, took up this matter as regards coffee.”

SUGAR IN RUSSIA.

A writer in the *Fortnightly Review* says that the Russian Government does not encourage the export of sugar, as it does not believe that such a course would be either profitable or advisable. Each year the Minister of Finance fixes the amount of sugar which shall be produced in the empire, and sets the price at which it shall be sold. The average domestic consumption is about 1,000,000,000 lb. This is announced as the legal limit of production which shall be placed on the market each year. In addition to this, it is permissible to manufacture 180,000,000 lb. more, which is placed in storage. The 1,000,000,000 lb. as it is sold pays an excise tax of 1½d. per lb. If at any time, through increased demand, sugar becomes worth more than the price fixed by Government, the 180,000,000 lb. are allowed to reach the market free of excise duty. If this does not supply the market at the legal price, the Government itself will buy from foreign countries enough sugar to supply the need for a bear influence upon the price. This has been done by Russia twice during the past ten years. This system, of course, precludes any export business in sugar. Twenty-three of the Russian provinces cultivate the sugar beet. In Poland and Lithuania there are 46 beet-sugar factories, and 128,678 acres are under beets, which yielded last year 1,843,592 cwt. of sugar.

SCIENCE AIDS THE SUGAR-PLANTER.

The news has just been given out by Dr. Wm. C. Stubbs, Director of the Experiment Station at Audubon, of his having successfully cultivated species of cane which yield nearly a third more of sugar per ton, besides giving a greater tonnage to the acre, than does the ordinary variety of cane now commonly grown in Louisiana.



DATE PALM

(*Phoenix dactylifera*—Linn.)

Nothing more gratifying to the sugar-planters of Louisiana could have been told them than this, for, while making rapid strides in the various mechanical devices for the manufacture of sugar, they felt that the beet-sugar industry had surpassed them in regard to securing a betterment of the sucrose content by judicious seed selection.

By a series of experiments covering a period of six years past, Dr. Stubbs and his efficient corps have endeavoured to select from a number of Trinidad canes, planted as experiment, those which were found to be best adapted, in growth and saccharine development, to the climate of Louisiana. After many painstaking comparisons and analyses—it was found that two specimens, “T. 74” and “T. 95”—were far superior to any grown here; they have averaged a sucrose content of 16 per cent. This yield is fully one-third as great again as that of the canes now grown in our State, and is to be looked at in the light of a God-send to the sugar industry.

These new canes, besides having the above-mentioned characteristics, are long-jointed and very hardy. Their roots grow very deep and strong; in fact, they are reported as being the only canes at the station that were not blown over by the heavy wind of 9th September. Besides, the stubble from them attains excellent stand, and grows with great vigour.

As shipments of these valuable canes are now being made to the planters throughout the parishes, no one should fail to avail themselves of the opportunity of procuring a bundle, which will be sent out on application to Dr. W. C. Stubbs, Audubon Park, New Orleans.—*Sugar Planters' Journal*.

THE DATE PALM (*PHŒNIX DACTYLIFERA*).

Undoubtedly, next to the cocoa nut palm, the date palm is of the most value to man. It is a beautiful and majestic tree, the stem forming a cylindrical column rising to a height of 50 or 60 feet. From the summit of the trunk it throws out a crown of leaves which are equally graceful in their formation and in their arrangement.

We, in Queensland, should utilise this beautiful palm not only for garden ornamentation, but for its fruits. One reason that this palm has not been more largely planted is that it is dioecious, having the male flowers on one plant and the female or fruiting ones on another. One male plant will fertilise a number of female plants, but it does not appear that a male plant is absolutely necessary to induce a female plant to bear dates. It is probable that the seeds of the dates will, in such a case, not be fertile, but the tendency of the age is to produce fruit without seed. There are at the present time two date palms growing in Brisbane laden with fruit—one in the Botanic Gardens (an illustration of which is here given), and the other in the garden of the late Dr. J. Bancroft, in Ann street. The seeds of these palms may not be fertile, but that is of little moment—the fact remains that the date palm (*Phœnix dactylifera*) will fruit in Queensland, and that freely. This palm should be largely planted—in suitable districts—around water bores, where they would in a few years form oases in tracts swept by hot winds, and in time they would become a real boon.

They might also be planted on the islands along the coast. Plants can be raised from the seed of imported dates, but it is some years before such plants fruit.

Offshoots taken from fruiting plants are best for planting, as these will fruit in about five years. A few years ago a number of suckers were imported and distributed by the Acclimatisation Society. Some of these should now be fruiting, and from them offshoots could be obtained.

There are several varieties of *Phœnix*, all of which are called date palms, but which are useless, except for decorative purposes, so care should be taken to obtain *Phœnix dactylifera*, all other kinds being useless for fruit-bearing.

In South Australia the planting of date palms has proved very successful. At Lake Harry (in the far north) the seedlings are now from 3 to 5 feet high, and many plants of either sex have flowered. The Algerian palms have made

great progress, and some are quite 10 feet high. There have also developed numerous suckers, such as Mr. Pink describes as best for transplanting. Good fruit has also been produced by several of the trees. The variety planted is the "Deglet Nour." At Hergott Springs the fruit has ripened for eight seasons. Here, there are 277 thriving palms. At Lake Harry there are 2,745, and at Oodnadatta 36. Our illustrations, for which we are indebted to the Conservator of Forests of South Australia, give a good idea of the plantation Hergott.

GINGER IN LONDON.

The *London Commercial Record* of 16th December says:—There is no getting away from the fact that the statistical position of ginger at the moment affords reasonable security for a bull operator. Glancing at the stock list, we find that supplies have been appreciably reduced, imports have not been excessive, and deliveries have been good, clearly proving thereby the correctness of our last year's small crop estimate, and testifying also to an improved consumptive demand. The stocks, although considerable, are held by strong hands, who are able and prepared, we feel sure, to support any attempt at instilling life into ginger. As to the coming crop, the general indications are that it will be a small one again, although we are not prepared to endorse the story of excessive rains which have washed away the soil and left the roots to dry up exposed to the burning sun, nor do we pin our faith to reports of a crop failure, but we are inclined to believe that the total yield will not exceed that of last year. There are reports of great scarcity of available ginger in India, a report which acquires some possibility of correctness by simultaneous rumours of shipments of ginger from London to Bombay. The position both in London and India is favourable to a rise, and we should not feel surprised to see a move shortly.

THE COTTON INDUSTRY.

By DANIEL JONES,
Department of Agriculture.

In recording the genesis of the cotton industry in Queensland, both in its agronomic and manufacturing aspects, it appeals to me as though in the fitness of things I should but relate the story of a strangled industry. The retrospective view covering some forty years of colonial experience revives the memory of the infant ambition of our colonists who, in those early pioneering times, became impressed with the idea that in the production of this staple there must be not only a profitable occupation for farmers, but a business that would benefit the trader and the shipper, and at a later stage of its development the industrial feature of manufacture. I propose to draw attention in this article to the vicissitudes attendant upon cotton cultivation, the causes of its collapse, and to show why the industry ought to be revived, and why, in the light of our newer experiences, public attention should be once more directed to both the cultivation as well as the manufacture of cotton into the various commodities that modern civilisation demands. I shall confine myself principally to the results of my personal knowledge of these matters as far as my identification with operations in Queensland is concerned.

The matter of reviving the various branches of the cotton industry in Queensland is at the present time exercising the attention not only of our own farmers, but has been warmly advocated not only in the Australasian Press but also in British journals. The shortage of the cotton supply from America, owing, amongst other causes, to disasters in Galveston, the vastly increased demand for the staple by the American home manufactories, the high prices ruling for wool which have had a corresponding effect on cotton—all these factors

naturally create an inquiry as to why the industry is neglected in a country which, in past years, has earned the highest distinction for the quality of its product, as was instanced by Queensland winning the gold medal at a Paris exhibition in the sixties against all competitors for the best variety of cotton. That this industry, dating from 1862 to the year 1871, had attained a pre-eminence among our staple products is clearly evidenced by the ardour displayed by the farming community in South Queensland in engaging in its cultivation.

Beginning in 1862, when 14,344 lb. of cotton were exported of an average value of 1s. 11d. per lb., and up to the year 1871, during which period 26,000,000 lb. were exported, the cotton industry flourished. Then came a gradual decline, and, finally, abandonment of production. This is accounted for by the cessation of the American Civil War, the lower prices ruling in consequence, the losses occasioned by the severe attacks of the boll worm, and for many seasons losses owing to a lengthened period of phenomenal wet weather occurring at picking time. A more recent and, from the farmers' standpoint, a more successful revival of the industry was instituted by the formation of the Queensland Cotton Manufacturing Company in Ipswich, whose manufacturing operations for the few years of its existence furnished many valuable lessons, chief among which was that, given fair conditions, the manufacture of cotton goods of a superior quality could be profitably engaged in in Queensland, and, further, that in this industry the farmers could reasonably expect a good demand for cotton at a fairly remunerative price. This revival occurred between the years 1890 to 1897, when financial difficulties of a deplorable character brought the useful operations of the Cotton Manufacturing Company to a standstill. This misfortune once again rang, for the time being, the funeral knell of cotton-growing in this State. It has always appeared to me passing strange that, in the light of past experience, the farmers and business people should have been so apathetic with regard to the industry. For whatever grievances the growers may have as against the methods of the cotton company in its financial relations with them, the company being then the only medium through which the growers could dispose of the fibre, still they had sufficient evidence of remunerative markets in the southern States of Australasia, and notably in Japan, for all the cotton they could produce. It has generally been conceded by the growers themselves that the profit from cotton is equal to and, in most instances, better than that derived from maize, and in the rotation available there existed a very obvious and valuable advantage in having a crop to replace those so long cultivated, with the result, in numerous instances, of exhaustion of the soil by the continual absorption of the same particular element of fertility. It has been clearly demonstrated in numberless instances in recent years that, on soils so exhausted that the ordinary field crops ceased to be profitable, immediately the change to cotton was adopted the returns proved much more satisfactory. Hence such exhausted lands can, by the simple change to cotton, become once more restored almost to their normal state of fertility. It has thus often come under my observation that farms, which by repeated cultivation of maize and hay crops have been unprofitable and practically abandoned to grassland, have, by the cultivation of this staple, become to the owners a source of profit, and have furnished a good object lesson in the value of rotation when otherwise a loss was the only result of the labour spent by violating an elementary law of agriculture.

Adverting to the cultural conditions of those early days, our farmers had to do a deal of experimental work ere they found the road to success. Not only had they to discover the best variety of cotton to grow, but it was an imperative necessity that they should be aware of the soils best fitted for the plant. Hence some errors were made in planting on rich alluvial lands, with the result that vigorous plants were grown, inclining too much to wood, and producing very little cotton. On the other hand, the other extreme error was committed of cultivating soils totally unfitted for the crop. Again, the treatment of the bush as regards annual planting or pruning was for some years a moot point, and later on came the plague of caterpillars, or boll worm,

to exercise the ingenuity and patience of the farmer. Through the gropings of our early pioneers in this culture, the present-day farmers have gained a decided advantage in learning what systems to adopt and what to avoid.

I will now proceed to briefly relate the causes leading to the abandonment of cotton-growing in the seventies, after a period of (in the early stages) very profitable operations. It is generally known that Dr. Lang, the very enthusiastic advocate of immigration to these colonies, was among the first to foresee the latent capabilities of the soil and climate of Queensland for this pursuit. The inducement to embark in cotton-growing was, I am sure, from his advocacy of the scheme, the means of attracting to these shores the very desirable class of immigrants that under his nomination and that of Mr. Henry Jordan sought homes in this colony during the periods these gentlemen were engaged in promoting emigration to these shores. The cotton famine, so disastrous to the Lancashire operatives, as the consequence of the Civil War in America, had its effect in calling attention to this State as a possible base of supplies. This stimulated the Government of the day, of which the Hon. A. Macalister was Premier, to offer a bonus of £5 per bale of 300 lb. of ginned cotton, in the form of a land order, to those who exported the fibre. In the light of our more recent experiences, whilst admitting that possibly some artificial stimulus may have been needed in those early days of our agricultural beginnings, it has been clearly demonstrated that this artificial stimulus was not in any sense necessary, inasmuch as from the beginning the profits accruing to the farmers engaged in cotton-growing were considerable. While returns of from £30 to £40 per acre were obtainable, the corollary of the high prices ruling in Liverpool, it appeared needless generosity on the part of the State to subsidise this industry. The bonus, although in itself an admirable principle when discreetly given, nevertheless, in this instance, gave rise to much misconception in the minds of persons in recent times. I have often heard it remarked that as soon as the bonus was withdrawn the cultivation ceased. This was by no means accurate, as a great deal of the cotton produced in the West Moreton districts was grown long after the withdrawal of the bonus, and without any prospect of any being given. The bonus as paid did not always serve the farmer, as in most instances the farmer sold his cotton in the seed to the merchant exporter, who on the bills of lading claimed the bonus. Of course in this case the farmer had an enhanced value for his crop, but the stimulus in this form to the grower was not quite on the best possible basis. However, I know of many a West Moreton farmer who, through the instrumentality of these land orders, was enabled to secure freeholds, and thus become a permanent settler in a district to the advantage of the State, without which assistance he might have gravitated either to the towns or to a sister State. It must not be overlooked that the inauguration of cotton-growing, in those early years of the agricultural development of the State, had a very marked effect on settlement in the Moreton districts, and on the social status of the progenitors of the sterling farming communities now occupying those areas to their own pecuniary advantage no less than to the development of the State.

It needs to be borne in mind that, at the period when our farmers undertook the production of cotton, the ordinary farm crops commanded good prices, which values were evenly maintained during the time that cotton-growing was at its zenith. This aspect of affairs is easily accounted for when we consider the rapid strides this industry made in the first few years of its existence. The agricultural statistics for the period give as the area under cotton for the year 1862 as 320 acres, while for the year 1870—eight years later—the area had reached the respectable proportion of 10,974 acres. The effect of setting aside so much land for this newer product was to maintain fair prices for ordinary farm products. Thus, when the untoward events, in so far as they affected cotton cultivation, happened, the farmer was not reluctant to again take up the ordinary course of farm crops. But the cessation of cotton-growing led, in a very short time, to a plethora of the ordinary farm crops, and I well remember as the

result of the cotton lands being planted in maize, &c., that the price of this article dropped to less than 1s. 6d. per bushel, a price not nearly as profitable as cotton, even with its lower values.

The trade in cotton with the United Kingdom in those days was entirely carried on by sailing vessels, the duration of whose voyages often lasted from 120 to 130 days, during which period there existed a considerable amount of anxiety as to the value of the fibre when the cargo should reach its destination. On a declining market, such as obtained when the supply of cotton on the Liverpool market became more regular, the effect on the trade in Queensland became one of considerable embarrassment. For this reason, once it became certain that values were declining, the agents and buyers were more careful in making advances against bills of lading; while in cases in which heretofore, on the basis of a steady value, the speculator was ever ready to pay cash at good rates for the cotton, the demoralisation of prices altered all this, and soon the farmer discovered that the only alternative remaining was to accept a price for his cotton at which the agent deemed it safe to buy, or to export on his own account to Liverpool, accepting in the meantime such advances on his crop as the firm the grower dealt with was willing to make. In our experience the matter of accepting advances from agents based on values some months prior to realisation of the crops in England proved unsatisfactory, as many farmers were unfortunately compelled to adopt this system, with the result that the rapidly falling prices placed the account on the debtor side, and the grower had to make a refund of the surplus advances. This aspect of the trade in the days prior to fortnightly mails, cablegrams, and all the modern facilities for getting at the pulse of the world's markets was a considerable factor in bringing about the destruction of the industry. The Queensland trader of to-day can hardly realise the difficulties of the producers of thirty years ago in the matter of placing their products on the home market. Frequently six or eight months would elapse before accurate returns as to the fate of their produce would come to hand. Four months home per sailing ship, two months return by the solitary monthly mail service of those times, a loss of a mail, or delay in selling, would often make up the term I refer to as common in our experience. It reads very strangely, in view of the meteorological conditions now and for some years past obtaining in South Queensland, that a succession of excessively wet seasons during the ripening period of the cotton crop should have created such marked losses as it did. We always expect, at the period of our wet season, from January to March, to have an unusual fall of rain; but the experience of our farmers in the coast districts during the years 1880 to 1885, which period marked the decline of the industry for some years, was very unusual; the heavy and, during some periods, continuous rains at a critical time damaged the fibre already expanding on the pods to such an extent as to render it worthless, by reason of the strained character of the lint and germination of the seed on the boll. Of course, while the wet weather continued, picking was out of the question for obvious reasons. Taking a retrospective glance at the character of the seasons, excepting the two periods of the 1893 and 1896 floods, such magnificent conditions have not since prevailed to the same degree; hence we may well believe that, while in the nature of events we may occasionally meet with such conditions in our cotton cultivation, nevertheless the general climatic condition must be of a favourable nature. As a sequence to the unusually excessive wet weather then prevailing, a phenomenal increase of the boll worm added to the already existing stock of troubles. This pest, although a menace in all cotton-growing countries, is not now, in the light of modern science and methods of coping with it, regarded with much apprehension. To our inexperienced planters the pest proved serious, the growers being ignorant of its character and the methods of destroying it. The consequence was that it thrived without hindrance, and in a few years it had increased to a considerable extent, with the result that heavy losses occurred. But in these days of cheap poisons and a cheap and effective method of distributing them by means

of proper appliances, this scourge is kept in restraint, and so another grave difficulty is removed from the path of the planter.

Looking backward over our early experiences in cotton-growing, with the inflated prices at the beginning, creating illusive hopes of permanent profit, our difficulties with uncertain markets, our heavy expenses for freights and ginning, our inability to utilise, as can now be done, the valuable by-products, our difficulties with finance, meteorological conditions, and pests, we see what formidable factors these were in determining for the time being the duration of cotton-growing.

Then for a period of about fifteen years this industry was neglected, while all the time many of the successful growers held longing hopes for the return of the good prices of the early days. However, these high prices were not to be obtained. Still, there was held to be sufficient margin if a local price equal to $1\frac{1}{2}$ d. per lb. in seed were obtainable. With this object a movement was initiated in 1889 by several farmers in the West Moreton districts to revive the industry, and a deputation waited on the late Sir Thomas McIlwraith, the then Premier, to request that a bonus be given for the manufacture of cotton goods. During the following session of Parliament, on the motion of the Hon. E. J. Stevens, then representing the Logan electorate, a sum of £5,000 was placed on the Estimates subject to certain conditions as a reward to the first person or company who would manufacture £5,000 worth of cotton goods from fibre grown in Queensland. This generous offer had the desired effect of bringing about the object of the deputation, and resulted in the formation of the Queensland Cotton Company at Ipswich. The company, during its few years of useful activity, was the means of reviving cotton-growing under more auspicious conditions, inasmuch as the farmers with their old-time knowledge, and with the advantage of better varieties of cotton, which presented marked differences in habit, yield, and quality of staple, all of considerable value as factors of profit, had now what appeared to be a certain local market. The cotton seed being imported from America by the Department of Agriculture from the best sources proved clearly that in the newer sorts obtained a great deal of improvement had been effected by the Americans as contrasted with the quality of the cotton previously grown in the State, and which had been allowed by our farmers to deteriorate by injudicious selection and continual replanting without change of seed, a most reprehensible practice contrary to the general principles of agriculture. It does not come within the province of my article to account for the failure of this company. I shall perhaps deal with that on some future occasion; still it might be well to state here that the conception of the promoters of the company was well grounded, as far as the encouragement of cotton-growing and manufacture were concerned. The causes that led to the failure of the enterprise were the causes that led to the cessation of cotton-growing for the second time. Want of capital and experience as to the class of cotton fabrics to manufacture were among the chief reasons for its failure. One thing was, however, certainly demonstrated in its brief career which was that in our State we can grow a good quality of fibre suited for the manufacture of calico, sheetings, towelling, and other fabrics equal to any imported, and at little, if any, increased cost for manufacture. Had this company not had to face the misfortunes of such a crisis as thwarted its efforts at its infantile stage, there is every reason to believe that it would still be a going concern and a factor of usefulness in our industrial work. While the operations of this company were the means of stimulating the farmers at that time to embark in the cultivation of cotton, it was soon discovered to be a grave error of judgment that the farmer himself did not look for other avenues to absorb his surplus crop. The company, doing its best, was able at the commencement to use but a small proportion of the crop grown. Thus, being unable to relieve the farmer of his produce, the embarrassment was keen on both sides. If the grower had then, as in former years, acted on his own initiative, and, having ginned his crop by means of the company's appliances, had exported the crop to Japan, where a paying price

equal to what was obtainable in Ipswich could be realised, the industry would have been continued on a permanent basis to the manifest profit of the grower.

Looking back through the years of our agronomic experiences, we can find no parallel instance of high promise and ultimate disappointment to our cotton-growing ventures. It is on authentic record that the Americans were fully 100 years before they succeeded in putting their cotton on the Liverpool market as a profitable article of commerce. It has, judging from our own experiences in this business, taken Queensland farmers a proportionably long time to solve the export problem in a permanently satisfactory manner. However, there is nothing at present, in my opinion, to prevent a large and continuously increasing export trade either to Japan or to the United Kingdom. The many serious obstacles encountered in our early export and farming days are now, to a great extent, matters of the past. Our opportunities for regular and rapid shipments, our advantages of lower freights, lower charges for commission and exchange, our closer proximity to ever-increasing markets, our further knowledge as to the treatment of the crop in its cultivation, more particularly as to the variety to grow, our observation based on the methods in vogue in America for dealing with the one particular pest, the boll worm, by means of arsenical preparations, cheap and effective in their application, the more scientific treatment of the cotton seed as demonstrated in the great value of the by-products obtained, which in former years were thrown away—all these things are new factors having an important bearing on the question of cotton-growing in Queensland. One other aspect of the question I must refer to, as the beginning of our Commonwealth existence marks an opportune time to do so—that is, the position of this industry in its manufacturing and cultural aspects under the Commonwealth. My experience in my official connection with the late Queensland Cotton Manufacturing Company has proved to my satisfaction that, given ordinarily favourable circumstances such as financial assistance and tariff protection of a moderate rate, we in Queensland can and are prepared to cater for the whole demands of the Federation in the matter of the ordinary domestic requirements of cotton goods. I boldly make this statement, having in mind the many vicissitudes undergone by those who have embarked in this industry both in its farming and manufacturing aspects. The disasters that have overtaken our initial efforts from time to time have been simply the result of lack of experience or want of opportunity. I am still confident we would have guided the affairs of the cotton company through the troubles of a financial crisis and of a flood had the tariff been a little more in our favour. A 5 per cent. duty on textiles in competition with the world was too severe a handicap for our little enterprise. One thing we were proud of, and that was we were never at fault in the quality of goods manufactured. Our articles gave splendid satisfaction both in this State and New South Wales, where we supplied a few special lines. Of course it is easy to be wise after the event. I am sure that had the gentlemen, who worked so conscientiously and diligently from the provisional directorate to the permanent directors of the company, had, at the initiation of the enterprise, the experience added later on, errors would have been avoided, and that avoidance would have completely changed the unfortunate result of the enterprise. However, I am still sanguine that in our district I shall once more note the busy hum of the cotton-gin; the fascinating whirl of the spindles, and endure the grating clank of the loom, as it weaves our snowy fibres into a valued fabric. This is the music of the trades; and by such may our new Commonwealth soon distinguish herself in her self-sustaining efforts. Our State should develop with such industries to our hands. We have here the raw material for textile needs which, if intelligently used, will give an impetus to pastoral and agricultural pursuits that will place this State in the van of manufacturing centres, and it is to be hoped that the lawmakers of our Federal Parliament will give this aspect of our needs favourable consideration when framing a federal tariff. Nevertheless, I sincerely hope that our farmers will not limit their energies in only seeking to serve the home demand for cotton, and, repeating the unfortunate occurrence of recent years, cease to

grow a profitable article of export solely because the local enterprise they trusted to to take their crop off their hands failed to do so, while the possibility lay before them of profitable export, not so very far afield, which had already been successfully tried. A little self-reliance and a little extra consideration on the part of the farmer would at that time have altered the position to the benefit of all interested. At that time efforts were made to get the business men and farmers to form themselves into an organisation to carry on an export trade, but for reasons apparent at the time nothing came of it. Now that the price of cotton has materially advanced, and that there is a strong probability of its being permanently maintained, this matter should be early attended to as one of the first practical steps towards re-establishing the industry. There are at present at Ipswich all the requisites for ginning, pressing, and baling cotton, which, I have every reason to believe, can be purchased on satisfactory terms. As our planting season begins in October, I hope the Department of Agriculture will see its way to again import the valuable class of cotton seed from America which it did some years since, and thus remove the only obstacle that now presents itself as far as the cultivation of cotton is concerned.

Anyone desirous of personally ascertaining the quality of the raw material produced in the State, as well as the variety and nature of the cotton goods manufactured at Ipswich, can inspect the same in the Museum of the Department of Agriculture, and I am sure that all the exhibits there clearly demonstrate all that I have claimed in this article; and I sincerely hope that, as a favourable period has occurred for the revival of this pursuit, cotton will soon once again be "King," and our new-born State will become what from its grand resources it is eminently adapted for—the premier textile manufacturing State of the Commonwealth.

COTTON BY-PRODUCTS.

In our article on the cotton industry in the last number of this *Journal* (1st January), we showed the great value of the by-products of the cotton plant, such as the seed, oil, oil-cake, husks, &c.; and what we then stated is fully borne out by an American exchange. From it we learn that in the United States in the crop year of 1870-71 there were manufactured 3,000,000 gallons of cotton-seed oil. Last season the output of the mills was 70,800,000 gallons. The mills used 1,888,000 tons of seed. Of the cake and meal manufactured by expressing the oil from the decorticated seed, 571,852 tons were exported. The sum of 23,500,000 dollars (£4,700,000) was paid to the planters for seed. Large quantities of the output of the mills are used in the south for feed and fertilising, and in the north and east for feeding. The value of cake and meals to the mill was 11,398,000 dollars (£2,279,600), and of oil 18,054,000 dollars (£3,610,800).

During the palmy days of cotton-growing in Queensland, there were exported 26,000,000 lb. of ginned cotton, worth £1,300,000. This would represent about 30,000,000 lb. of seed, the whole of which was thrown away as useless. At £5 per ton—and cotton seed is worth more in the market—this means that £66,960 were left on the manure heap or floated down the river. Again, 13,392 tons of cotton seed will produce 495,504 gallons of oil, which, at £23 per ton of 224 gallons, total £50,876—all wasted. The oil cake resulting from this would have brought from £4 to £9 per ton, the latter price if the seed were decorticated.

It will thus be seen that the by-products alone were worth nearly £100,000, not one penny of which was obtained, owing to the ignorance of the pioneers of the industry.

Mr. Daniel Jones, whose able paper on the cotton industry appears on another page, clearly demonstrates that, if the work were again taken up, Queensland farmers would have a crop which would pay them better than maize or wheat, and for which there are markets both in England and in Japan at remunerative rates.

THE PRICE OF COTTON.

It will be interesting to intending cotton-growers to know that a farmer of Georgia, in the United States, last season secured twenty-eight bales of ginned cotton from 25 acres, and of such good quality that he obtained 24 cents per lb. (1s.) at Savannah. When such price can be obtained locally in such a cotton-producing country as the United States, it should be an incentive to our Queensland farmers to revive the industry in this State.

COTTON IN GERMANY.

The agricultural department of the *New Orleans Picayune* has received a report from Consul John F. Winter, consul at Annaberg, treating of cotton consumption in Germany. The consul says:—

“The German Colonial Association recently sent a petition to the Imperial Chancellor requesting that every means be used to introduce cotton-growing into the different German colonies where climate and soil would be favourable to the same.

“If, for some reason, Germany should be cut off for one year from her cotton supply, there would be a crisis of incalculable consequences.

“Of the nations on the continent, Germany takes the lead in cotton consumption with \$71,400,000; that of France and Russia together equals \$95,200,000.

“Germany, with the exception of about \$170,000 worth of cotton grown in one little colony, is entirely dependent for this commodity upon the United States and England. This accounts for her desire to produce her own cotton. Germany, France, and England have never forgotten the years of 1860-62, when their cotton supply was cut off by the blockade of the southern States.

“Again, there is always a tendency on the part of cotton industries to gravitate towards the centres of production, as the following figures showing the increase of cotton industry from 1885 to 1895 prove—

“England, 4 1-2 per cent.; United States, 24; East Indies, 45.

“The real reason of the shifting of cotton mills and manufactures to the point of production is the money and time saved in transportation, and this is the problem which confronts the German empire to-day.”

A MARKET FOR COLONIAL TOBACCO.

In October of last year a letter was forwarded to the Minister for Lands of Western Australia by the secretary of the Fremantle Co-operative Society to the following effect:—I take the liberty of bringing under your notice the fact that the English Wholesale Co-operative Society, Manchester, is an almost unlimited buyer of colonial-grown tobacco leaf. This society has already bought from Victorian growers over 150 tons, and is unable to secure anything like a sufficient supply. Possibly this is one of the minor agricultural industries in which Western Australia might also engage. The Victorian Department of Agriculture is about to fit up, in the town of Wangaratta, a thoroughly equipped store to assist the growers in further extending the industry, and a largely increased area is being put under crop. The Government expert says the growers are quite satisfied with the prices given by the society. The society purchases the leaf direct from the producer, ships and manufactures it into tobacco, which is retailed to the consumer through its 1,700 distributing branches scattered throughout the United Kingdom. I may point out that the society is also doing an extensive business in other Victorian products, as the producer is at last realising the benefits of cash payments and the retention for himself of the profits and perquisites hitherto obtained by the numerous middlemen, whom the society has displaced.

YIELD OF RUBBER.

Although we have on several occasions given full particulars concerning rubber-planting, yield of rubber, &c., we have repeated inquiries as to the net returns which may be expected from a plantation. Perhaps the following letter addressed to the *India Rubber World* by Mr. A. H. Berkhout, late Conservator of Java Forests, will convey to intending rubber-planters in Queensland the necessary information. Mr. Berkhout writes:—

In *The Indian Forester* (Vol. XXIV., page 160*), I presented some facts in relation to the oldest india-rubber plantation in the world, which is located on the Pamanukan-Tjiassem estate, in the Residence Krawang, in Java. At that time I wrote that the plantation came into existence in the year 1872, basing my information on personal conversation with the owner of the estate, but the opinion of the present chief overseer, Herr van Henkelom, seems to be that the plantation dates from the year 1864.

The young plants of *Ficus elastica* were obtained from the adjacent forests, by cuttings of branches, or by marcotting the uncultivated trees, an operation to which the inhabitants of Java frequently resort. The before-mentioned rubber trees are especially adapted to the process of marcotting. All that is necessary is the removal of a strip of bark $\frac{3}{4}$ centimeter wide, and to bandage the wound with earth. After about fifty days, roots will appear through all sides of this ball, which can then be cut off. It is advisable before planting these young plants, which are about $\frac{1}{2}$ meter in height, to place them, or rather nurse them, in rich, well-shaded soil for a period of about fifty days, in order to heal the cut thoroughly.

It is my opinion that the original cost of this plantation on the Tjiassem estate was not very much, because the *Ficus elastica* was planted about $8\frac{1}{2}$ yards apart each way, or seventy-two to the acre, within coffee plantations which were no longer productive, and required not much cultivation. I estimate the cost of the plantation at about 7 dollars (29s.) per acre. Altogether $72\frac{1}{2}$ acres, embracing 5,200 trees, were planted.

The first tapping was done in 1886, and the following figures will give the details:—

Years.	Pounds.	Average Ounces per Tree.	Value.	Value.
			\$	£ s.
1886... ..	5,512	17	2,880	572 0
1887... ..	4,954	15	2,592	518 4
1888... ..	1,514	4	792	158 4
1890... ..	3,307	10	1,728	345 6
1891... ..	6,113	18	1,858	371 6
1892... ..	5,992	18	1,229	245 8
1895... ..	3,197	10	1,973	394 6
1896... ..	3,113	10	1,561	312 2
1897... ..	6,731	21	3,648	729 6
1898... ..	6,731	21	4,213	842 6
Total	47,164		\$22,474	£4,490 8

Tappings could not be made in every year. In thirteen years (in three of which the trees were not tapped) a total of 47,164 lb. was harvested, an average of 3,628 lb. per year, or 10 oz. per tree per year. During the four years 1895-98 the average was 4,943 lb., or 15 oz. per tree. The yield per acre, therefore, from 1886 to 1898 averages 50 lb.; and from 1895 to 1898, 68 lb.

The figures given above, by the way, in the column headed "Value," must be understood as referring to the income to the planter after deducting all expenses, not only of harvesting the crop, but also the initial expenses and the yearly expense for care of the plantation. From the information supplied to

* Quoted in *The India Rubber World*, 1st August, 1898.

me in regard to the prices obtained for the rubber, I should infer that the yearly expense for the last four years covered by the table had amounted to an average of 12 dollars (£2 10s.) per acre per year.

An analysis of the figures above given will show an average yearly net profit of 39·30 dollars (£8 3s. 9d.) per acre, the figures for 1898 showing a profit per acre of 58 dollars (£12 1s. 8d.)

With respect to the possible yield from *Ficus elastica*, it may be mentioned that Herr Mulder, in Sudimara (West Java), obtained in 1897 from three trees 48 kilograms (105·6 lb.), and twenty months later from the same trees 45 kilograms (99 lb.) This is, respectively, per tree 35½ lb. and 33 lb.

YIELD OF RUBBER IN MEXICO.

R. P. Probasco, of Chicago, favours *The India Rubber World* with the results of tapping cultivated *Castilloa* rubber trees by A. B. Coate, superintendent of La Soledad Plantation, on Trinidad River, isthmus of Tehuantepec. Mr. Probasco received four specimens—

1. Weight, 3 lb. 2 oz.; collected from three trees, in diameter 16, 12½, and 14 inches.
2. Weight, 1 lb. 2 oz.; yield of one tree, 12 inches in diameter.
3. Weight, 1 lb. 9 oz.; yield of one tree, 11½ inches in diameter.
4. Weight, 2 lb. 4 oz.; yield of one tree, 18 inches in diameter.

Total weight, 8 lb. 1 oz., yield of six trees, gives an average of 1 lb. 5½ oz. per tree. None of the trees is over eight years; some of them only six. Rain fell while the trees were being cut, washing away some of the rubber milk, and various other unfavourable conditions existed.

SISAL HEMP.

Some thousands of Sisal hemp plants have been planted round the island of St. Helena, Queensland's penal establishment. The suckers were put in about twelve months ago, and they now average about 5 feet in height, each plant having from 40 to 50 leaves from 4 to 5 feet in length. If any proof were wanted of the adaptability of our climate to this valuable plant, it is plainly furnished here. If the authorities of the island are provided with facilities to clean the leaves and produce the fibre during the ensuing twelve months, there can no longer remain any doubt as to whether the crop would pay or not, especially if accurate records were kept of the actual amount of labour and time expended from the cutting of the leaves to the baling of the cleaned fibre.

REWARDS FOR NEW INVENTIONS IN MACHINERY FOR CUTTING AND LOADING SUGAR-CANE.

The Hawaiian Sugar Planters' Association is offering prizes to the amount of 6,500 dollars (about £1,500) for new inventions in machinery adaptable to cane manipulation. Two thousand dollars will be awarded to the inventor of the best cane-cutting machine, and the balance will be divided amongst those bringing forward the best practical methods of loading and unloading cane, &c. Here is a chance for some of our Queensland inventors, one of whom, Mr. Pryce Trevor, invented and exhibited at Bowen Park, in August, 1900, a cane-planting machine which is much used by Northern planters, who state that it will do the work of thirty men, and only requires a pair of horses and two men to plant evenly and regularly 5 acres a day. The machine was described and illustrated in this *Journal* in the September number, 1900.

Forestry.

COMMON SENSE IN FORESTRY.

From Senator Taliaferro we (*Florida Farmer and Fruitgrower*) have received a report on forestry in Sweden, by Gen. C. C. Andrews, published by the Government, which contains a great amount of practical information that Floridians may well heed. The Government of Sweden makes a net profit of 1,680,753 dollars a year on the public forests, which are very systematically managed. The method adopted in most of these forests is regulated thinning—that is, chopping out, every year, the trees which may be considered to have reached maturity.

The propagation is left largely to Nature by voluntary seeding. The idea seems to prevail that, if man manages the propagation, he is liable to plant seeds of inferior, dwarfed, or crooked trees, and by his care he will raise the weaklings, only to find out after several years that they are not worth raising. But if all the seeds are left to come up together in the forest, the weaker seedlings perish in the competition, while the stronger survive. But the foresters interfere with Nature to some extent by chopping out the inferior trees, leaving the better ones to perfect seed. The ground is hoed and loosened up so that the seeds may readily germinate.

Where the young seedlings are not thick enough on the ground, some foresters sow seed, others transplant trees from places where they are too thick. The transplanting system is considered best for the pine, spruce, and birch; but seeding, on the whole, is more common. On a plot of about 12 square feet ten seeds are sown. When not sown in a nursery, they are sown on the north side of or near stumps, stones, or other objects that give shade and protection from the browsing of cattle.

Continual thinning protects the fertility of the soil better than the system of tract-cutting, for thinning maintains an equal and constant covering, while tract-cutting lays bare a whole region at once, leaving the sun to burn out its fertility. The forests are raised by propagation in groups by cutting the larger ones on the borders, to extend until they at length join each other. Each group will consequently have the highest and largest trees in the centre, and the trees will decrease in age and size toward the edges of the groups. This amphitheatre order, grading the trees in height, gives each one some light from the side as well as the top. Insects do not attack trees thus graded off as much as they do those which are thickly crowded and shaded and of a uniform height.

One method of preventing the spread of forest fires is the planting of belts of deciduous trees through the coniferous or evergreen forests. These check the progress of conflagration.

RED GUM WOOD-PAVING BLOCKS.

Last year there was a display of the method of cutting and handling red gum wood-paving blocks, at the wharf of Mr. Edward Alcott, Millbank street, Westminster. Red gum is an American wood which is being largely used for paving purposes. In London, the thoroughfares of Lower Regent street, Piccadilly, and the Haymarket have lately been laid with them, and a large order has been given for blocks to be used in the western suburbs. Red gum is harder than deal, but not so hard as the Australian hardwoods, and it is stated that it gives a better foothold to horses than any of these classes of timber. It is also averred that it neither shrinks nor swells under variations of moisture, which is a very valuable feature in a paving wood.—*Engineering*.

THE TIMBER SUPPLY OF THE UNITED STATES.

The enormous inroads being made into the timber reserves of the United States are now raising serious apprehensions in many quarters, though for long it was impossible for the prophets of lean years to gain the ears of any of the great consumers or purveyors of timber. The opening up and development of the United States was immensely accelerated by the superabundant supplies of excellent timber so long available. It was this that made it possible to carry railroads across valleys on timber tressles, in place of on the heavy embankments, at a large saving in cost and, above all, in time. The fact that the tressle was more costly to maintain, and liable to complete destruction by fire, was a matter of minor importance in the case of pioneer lines. Sleepers were so cheap that creosoting or other methods of preservation were unnecessary, and as many as eighteen sleepers were placed under a 30-foot rail, thus enabling it to do the duty of a heavier section less efficiently supported. Great rivers were cheaply spanned by Howe trusses of timber; and for many years the sub-aqueous portions of the piers, even of steel bridges, were invariably of wood. The methods of lumbermen were governed by the apparent inexhaustibility of the supply. Every attention was paid to the rapid cutting and handling of the timber, and little to economising it. Whilst in England it has ever been the practice to cut trees off at ground-level, thus getting the maximum amount of marketable wood from a particular tree, this plan met with no favour with American lumbermen, since by making the cut higher up the time saved was more than equivalent to the value of the wood wasted. For converting into planks, circular saws of unprecedented dimensions were constructed, the output of which was enormous, but was accompanied by a large waste of excellent wood, owing to the great width of the kerf. These halcyon days have now departed, and all the principal timber consumers in the States are turning anxious attention to a possible—indeed, probable—limitation of the supply. Some of the principal papermakers are now employing skilled foresters to control their timber lands, and to prevent the reckless waste hitherto general. The railway companies are, one by one, following European practice in the matter of prolonging the lives of their sleepers by creosoting or other treatment. The American railway demand is enormous, about 90,000,000 sleepers being laid annually, and to this must be added that for other departments and for other markets. According to the census of 1900, the total consumption of the American market was then just under 2,000,000,000 cubic feet per annum, and practically no steps had at that date been taken for the restocking of the forest areas. If matters continue as in the past, the States will soon have to depend on Canada for a very large proportion of their timber supplies. Such a condition may result in a tariff war, since the Americans, anxious to keep the profitable conversion industry on their side of the border, have placed heavy taxes on importers of converted timber; whilst, on the other hand, Canada, restive under this restriction, on the establishment of sawmills within her territory, has now secured the power to establish, by proclamation, an export tax on sawn logs whenever circumstances make such a course advisable. There is no export tax on converted timber, but the American Customs regulations impose a special tax on such timber, if an export tax is levied on saw logs by the exporting country.—*Engineering*.

A similar recklessness in the consumption of timber has been observed during a long series of years in Queensland. Fortunately, steps have now been taken to regulate the timber industry of the State, and by judicious management it will probably be yet possible to perpetuate our forests. It is to be regretted that nothing has yet been done to prevent the wholesale destruction of the beautiful palm groves on the North Coast line. It is said that no less than 12,000 of these trees were sent to Brisbane on Commonwealth Day for decoration purposes.

TIMBER IN RUSSIA.

The timber trade of the White Sea, always the main source of the welfare of Northern Russia, was exceedingly prosperous last year, owing to the extraordinarily high prices prevailing for this class of goods. The total value of wood exported has risen from £220,000 in 1888 to £868,228 in 1899. The White Sea ports between them, including the Lapland coast, have twenty-five saw-mills, employing some 5,000 hands, and yielding over £1,000,000 annually.—*Engineering.*

TIMBER FAMINE IN AMERICA.

Mr. Harry Gannett, in the *Forum*, predicts a timber famine in America as the result of fires and careless foresting:—The present methods of lumbering are extremely wasteful, from 60 to 75 per cent. only of the tree being cut and utilised as lumber. The younger trees—those of insufficient size—or the trees of inferior species, are left standing. The waste of the cut trees is left upon the ground, where it dries, and inevitably, sooner or later, intentionally or unintentionally, is burned, producing a hot fire which destroys all the trees left by the lumbermen. Thus, over the lumbered tract not only are all the mature trees cut, but the young growth, which might be depended upon to seed the area for a future crop, is destroyed by the inevitable fires.

CONIFERS AS RAIN GAUGES.

According to a recent number of the *Revue Horticole*, M. Felix Sahut has lately communicated to the Congr s des Soci t s Savantes observations respecting certain plants that act as registering rain gauges:—"Mention has already been made of the influence of certain more or less severe droughts in the French Mediterranean upon *Pinus Laricio* of Corsica, and Cephalonian Fir. The lengthening of the branches of these two species is always proportionate to the quantity of rain falling during those months of the year when it is most profitable to them. Co-efficients have been established indicating what the degree is for each month of the year. These co-efficients enable the relationship that exists between the amount of rain fallen and the greater or less intensity of the vegetation which it has encouraged to be determined. It is shown that, under these conditions, it is possible to judge approximately the quantity of rain which has fallen by measuring exactly the length of the leader, or of the branch produced yearly on these species of pine, and, if the estimate is not absolutely proportionate to the quantity of rain registered by the rain-gauge, it closely approaches to it; and a still closer estimation may be made by taking into account the relative value of the results produced by rain in the several months of the year. It is, therefore, possible, to a certain extent, to use plants specially selected for this purpose as actual registering rain-gauges."

AN INCH OF RAIN.

What does an inch of rain mean? Few persons have a definite idea. An acre, if calculated out, will prove to be 6,272,640 square inches. An inch deep of water on this acre will be as many cubic inches of water, which, at 231 to the gallon, is equal to 27,154 gallons. This immense quantity of water will weigh 228,190 lb. or 114 tons. One hundredth of an inch (.01) alone is equal to over 1 ton of water to the acre.

In forty-eight hours, during the month of January, 15½ inches of rain fell at Geraldton. This was equal to 420,837 gallons per acre or 1,767 tons, or about one-seventh of the total quantity required to irrigate a crop of sugar-cane during the growing season.

Science.

PROFITABLE UTILISATION OF CONDEMNED MEAT.

The following, which we take from the *Meat Trades' Journal*, cannot fail to be of great interest to municipal and shire authorities, as well as to butchers and all who have to deal with meat in any form :—

This question has been before the Dublin Corporation for some time back, with the result that in September last the Markets Committee passed the following order :—

“That a deputation of two members of the Corporation be appointed to visit Hamburg and Munich, where Podewil's system of destroying all slaughter-house offal is being used, to report on the feasibility of its being beneficially worked in connection with the city abattoir.”

They subsequently deputed Councillor Clancy and Councillor Dr. Kennedy to visit some Continental cities; and we append their report, which the Markets Committee have since adopted.

Your committee beg leave to report that pursuant to the Order of Council of 3rd September, 1900, a deputation went to Munich, Bavaria, where the principal works of the company are situated, and where they carry on business under the style of “The Podewil's Faecal Extract Fabrik.” The deputation called upon the Burgomaster of Munich, who courteously rendered them every service in his power, and deputed a representative to show the deputation the apparatus at work in the special abattoir belonging to the corporation. There were also present Baron Podewil, Mr. Emil Claus, and Mr. Haider, all of the Podewil Company.

The Munich Special Abattoir has two apparatuses at work, and there are treated in them all kinds of animals, such as horses, dogs, cattle, &c. The quantities handled are therefore considerable, and the products, fat and manure, run into a very large sum per annum. The fat is of very good quality, and is sold for an average price of about 22s. per cwt. The manure is of high ammoniacal strength, and brings about £5 per ton. The boiler heating surface required for this installation is 25 square metres, equal to 269 square feet; the height of the chimney employed is 75 feet. There is a horizontal condensing engine of 10 h.p., and air pump attached to tail rod of same. There is hardly any smell in the premises, but any there is is accentuated by the location of the boilers in the machinery room. The deputation obtained a photograph of this installation. The deputation had originally intended to proceed to Hamburg next, but they ascertained that the most complete and modern installation yet constructed had been recently put up in Dresden, where the building was specially constructed to suit the machinery, as in contra-distinction to the building at Munich, which was originally erected for other purposes. They went to Dresden next, and are exceedingly glad that they had an opportunity of seeing this splendid installation. The deputation on arrival visited the Town Hall where, however, they were unable to find the officials in authority. Subsequently the deputation received the necessary permit, and drove to the abattoir, which is just on the outskirts of the city and similarly situated to the Dublin Abattoir. The whole design of the place is an admirable one. There is a complete special abattoir for diseased animals, and the superintendent and staff live on the premises in a house located within the grounds. Altogether the work is so great that five men are constantly employed. Diseased cattle, sheep, pigs, and horses, &c., are brought to this abattoir and slaughtered. Unless required for dissecting purposes, they are put into the Podewil's apparatus at once, and reduced to fat and powder. The deputation would like to say that the arrangement of the buildings here is admirable, and they subsequently obtained a plan and some photographs so as

to clearly understand same. There is a manager's office, a dissecting-room splendidly equipped with special tables, and furnished with cupboards containing dissecting instruments, slaughter-house, and last of the series, the Podewil apparatus room. The slaughtered animals are cut into convenient sections and carried by shutes into the apparatus. Opening from the apparatus room is the boiler-house, and off the latter are engineer's workshops and a bath, very nicely equipped. The building is two-storied, and above is a loft, grinding mill, and sifting apparatus in connection with the plant. There are three apparatuses here—two drums with capacities of 25 cwt. each, and one drum of a capacity of 30 cwt. The principal things to be noted in connection with the constructive part of this plant are as follows:—

1. The apparatus is in a specially formed well.
2. The building is lined throughout with glazed brick.
3. The engine is horizontal, condensing, of 15 h.p. noml. Air pump is attached to tail-rod of engine.
4. There are two fat cylinders, worked alternately.
5. Boilers have 390 square feet heating surface; there are two, and sometimes both are wanted to their full capacity.
6. The bathroom, dissecting-room, and workshops struck the deputation as being of a very practical and sensible character.

With regard to the material itself. It appears that when the diseased animals are placed in the drums they are gradually reduced to powder, the fat meanwhile being removed automatically. The dry powder is removed from the drums and hoisted to the floor above by mechanical elevators, where it is allowed to accumulate, and is then ground by machinery into an impalpable powder. There are also mechanical circular sieves attached, and these separate the fine powder from the gruffs or unground portion. The fine powder is a valuable product. Instead of being used as manure, it is nicely packed in 1-cwt. bags, and sold at £10 per ton for feeding swine, fowl, &c. Across the bags is printed a guarantee to the effect that the contents contain 70 to 80 per cent. of protein. This adaptation of the product for other purposes than manure is an entirely new idea, and at once shows how such an apparatus in the hands of competent people can not only be made a complete protection to the public against risk of diseased meat, but can also be made the means of a very handsome revenue to the corporation. This compound is sold to farmers, dairymen, and others, who mix 10 per cent. of it with pig and fowl food, and is not only palatable but fattening. There is no smell in this building; indeed, it is kept spotlessly clean, and is a model place to follow. It is a source of much profit, and hygienically is a boon to the community. We may here remark that we were impressed with the precautions taken by the municipal authorities in continental towns against the sale for food of any description of infected meat.

No meat is permitted to be exposed for sale unless it bears the brand of the chief official of the public abattoirs in which it is killed and dressed, and there are no private slaughter-houses. The deputation are indebted to the good offices of Herr Brater, town clerk, who offered to supply plans or any other information which the Corporation of Dublin might require. The plans have since been received by the Right Hon. the Lord Mayor. The deputation have formed the opinion that two apparatuses would suit the Dublin abattoir best, inasmuch as there would then be a constant safeguard against break-down. This plant will deal with large quantities of material, blood, manure, diseased carcasses, and bones, which can be indiscriminately reduced to powder and fat, and will be a safeguard to public health. The deputation are satisfied that such an installation would be a source of profit to the corporation.

Our visit to Munich and Dresden has impressed us with the absolute necessity of having the Podewil system attached to the Dublin abattoir for many reasons, but mainly because of its effectiveness in thoroughly destroying every portion of diseased animals, and because of the possibility at any time of a virulent outbreak of cattle or swine plague in the city or county, or indeed of any of the adjacent counties on which our cattle market mainly depends for its large and increasing weekly supply of cattle, sheep, and pigs.

The microbes of the fever develop first and multiply in the intestine of the insect, which has got it first in some yet unknown fashion from the damp soil or from the atmosphere. Those microbes spread throughout its body in the shape of extremely short and thin microscopic threads. When mosquitoes introduce their little proboscis into the human flesh they leave behind a few of those dangerous living germs, which then multiply in the blood, eating away its substance and excreting a sort of poison which is, properly speaking, the cause of the diseased state of the body known under the name of malarial or other fever.

Those facts being known, the prevention is not far to look for. We must absolutely preserve ourselves from mosquito bites, at least about two hours after sunrise and after sunset.

Mr. Naudin, of the Institut de France, assures us that to keep off the mosquitoes it suffices to wash the body with eucalyptus vinegar.

Perhaps some of our readers know of some other remedy, for it is hardly likely that the mass of the population can be under mosquito nets at the stated hours.

It might, perhaps, be worth while to try in some shape the green or dried leaves of the castor oil shrub, a plant to which the mosquitoes seem to have a peculiar dislike.

While on the subject of insects as a medium of disease, the writer thinks that the common fly deserves special mention and shunning. When one considers the disgusting substances these dirty insects feed upon before they come and settle in our eyes, on our lips, or on any open wound, when they do not taste first our daintiest dishes, or bathe or drown in our choicest drinks, one is justified in considering them as a most dangerous medium for imparting all sorts of infectious diseases. They are also very troublesome to farm animals, and especially to horses.

In a French publication a writer stated that flies can be kept off by smearing the horse's eyes with an ointment made by simply rendering down 1 lb of lard, to which are added a few strong-smelling laurel leaves (*Laurus nobilis*). It was further said that at Strassburg, the butchers succeeded in keeping flies off their premises by the use of the above ointment on the doors and window-frames of their shops. We should be glad to hear of our readers' experience on the subject.

A recent writer observes :

"The fact that the malarial parasite is paludal in its habits, and that the mosquito is a bloodsucker and also paludal in habit, is extremely suggestive of this connection. The idea, however, did not take definite form until Patrick Manson, in his Goulstonian lectures, delivered in 1896, set forth a definite hypothesis, based on certain well-established facts—namely, that the malarial parasite possessed a flagellating phase, that this phase is developed from the mature parasite, that the flagellæ, when formed, break away from the parent parasite, and that, when free, the flagellæ were capable of living as independent organisms. He was thus led to believe that the flagellæ was the extra-corporeal phase in the life-history of the parasite. As it was impossible for the latent form in which this organism originated to escape from the human body by itself, it was necessary to invoke the assistance of some outside agency. The most probable agent was the mosquito, and Manson supposed that the flagellated body was sucked, in its latent form, into the stomach of the mosquito and developed therein. The flagellæ then broke away from the central sphere, and in virtue of their locomotive power traversed the blood in the mosquito's stomach, penetrating the stomach wall, entered some cell and started the 'outside of the body' life of the malarial parasite. Manson still believed, however, that malaria could be air or water borne, for he supposed that on the death of the mosquitoes the parasite was liberated and either inhaled from the air or carried into the system in drinking water."—*Gaillard's Medical Journal*.

SNAKE-BITE.

During the months of February, March, and April, the snakes in this portion of the Commonwealth are usually very much in evidence, and although cases of snake-bite are singularly rare considering the numbers of these reptiles which infest certain portions of the country, notably swampy regions, yet a word or two of advice on the best method of dealing with a bite can never be out of place.

Mr. Edgar R. Waite, F.L.S., Zoologist to the Australian Museum, Sydney, whose popular account of Australian snakes forms a most readable and valuable treatise on the subject, states that sixty-two kinds of venomous snakes are known to exist on this continent. The remaining thirty-one kinds are harmless. This seems a most alarming list, but Mr. Waite reassures the timid by adding that of this number few are harmful to man, and that, therefore, a clear line must be drawn between those snakes that are merely venomous and those which are deadly.

Of the latter there are only five common species. There are:—The brown and black snakes, the superb snake, the tiger snake, and the death adder. The superb snake is known in Victoria as the copper head, in Tasmania as the diamond snake, where it is deadly; but the diamond snake of the other colonies is harmless.

All the sea snakes are venomous. The freshwater snakes are harmless. On this subject Mr. Waite has written a short but clear and concise paper in that excellent annual published by Messrs. Sapsford and Co., known as "Wragge's Almanac." This should be read by all dwellers in the country districts.

In India the death of human beings from snake-bite reached 22,480 in 1899, whilst of cattle 3,793 were killed. On the other hand, in Ceylon only two deaths of Europeans have ever occurred from this cause, the second, which happened very lately, being that of Mr. L. F. White, Railway Engineer. On this head the *Tropical Agriculturist*, Colombo, says:—

If Mr. White had known what to do, there is a possibility that his life might have been saved. (Each engineer and, indeed, new arrival for the Ceylon jungle should have a copy of "Medical Hints" or some such useful pamphlet for guidance.) First, there ought to have been a simple but very tight ligature tied round his arm above the bite; but even before this, or simultaneously, the part bitten ought to have been cut freely with a penknife or razor, and the part made to bleed freely. But let us give specific advice on the authority of the late Drs. Elliott and Dickman:—

SNAKE-BITES.—Pinch up the skin between the finger and thumb, and cut out a piece about the size of a shilling. Be sure you cut out the scratch made by *both* fangs of the snake. If you cannot pinch up the skin, stick a pin or anything else to lift it up; but in any way cut or dig out the piece. Any knife—whether pen or table knife—will answer. Have no fear of the consequence of your cut; there is no artery near the surface that you need be apprehensive of opening. A bandage will therefore stop any bleeding that may follow. Cut, however late, and cut boldly, for life often depends upon your doing so. *Liquor ammoniæ* in twenty or thirty drop doses should also be given every hour, or every two or three hours, according to the urgency of the symptoms. Pain is first complained of in the part bitten, which rapidly extends upwards; pain is also complained of in the belly, afterwards breathing becomes laborious, an impediment in swallowing is felt; and the pulse and respiration become barely perceptible before dissolution takes place. Spasms are sometimes recognised. Bites from the *Tic Polonga* are sometimes followed by discharges of blood from the stomach.

There have been many narrow escapes of Europeans from snakes in Ceylon; one of the most thrilling was that of the V. A. in Belihuloya rest-house, who found, on lifting his pillow in the morning, a good-sized cobra

curled round his gold watch, and which had probably been under his head most of the night. It is truly surprising that poor Mr. White did not at once take some step to deal with the bite on his arm. We trust the warning his case affords will be widely noted.

It is stated that Dr. A. Calmette, of Paris, France, has discovered an antidote against the effects of the bites of the most deadly snakes. It is a serum taken from an ass or a horse immunised against venom of snakes. It will retain its effects if kept in as cool a place as possible, away from daylight and without taking the phial out of its box. At or above the temperature of 50 degrees Cent.—90 degrees Fahr.—the serum becomes inactive. Its preservation has been guaranteed by adding a very small quantity of camphor.

Preventive Power.—The preventive power of the serum is, at the least, of 10,000—*i.e.*, it is sufficient to inject rabbits preventively with a quantity of serum equal to 1/10,000th of their weight to enable them to bear, one hour afterwards, without their being intoxicated, a dose of 1 milligramme of dry venom of *Cobra capella* of medium activity, said dose sufficient to kill proof rabbits in less than four hours.

Therapeutical Action.—If injected in sufficient quantity to persons bitten by snakes, the anti-venomous serum will prevent the effects of the venom, providing intoxication is not too far advanced. It must be injected as soon as possible after the bite. Generally its intervention is still very efficacious an hour and a-half after the bite with adults, who rarely die but three hours after the bite of the most dangerous species of snakes.

The serum is active against the venom of all species of snakes existing in the ancient and new world. It has been experimented with the venoms of the *Cobra capella* and *trimeresurus* of Asia, the *naja haje* and *Cerastes* of Africa, the *Crotalus* of America, the *bothrops* of the West Indies, the varieties of *pseudechis* and *hoplocephalus* of Australia, and the *vipers* of Europe.

The dose to employ varies according to the species of the biting snake, the age of the person bitten, and the time of the intervention.

Generally 10 cubic centimeters are sufficient for children under ten years, and 20 cubic centimeters for adults.

In Vol. III., p. 385, of this *Journal*, we gave an illustration of the marks produced by the teeth of snakes as shown by Dr. Krefft. That scientist said that the bite of a non-venomous snake shows tooth-marks, thus— $\begin{smallmatrix} \vdots & \vdots \\ \vdots & \vdots \end{smallmatrix}$ whereas venomous snakes leave as a rule only two punctures, although occasionally three and even four are observed, but they can always be distinguished from the bite of the harmless species, as the punctures take the following forms:—

Two punctures— . . ; three— . . ; four— : :

The bite of the sea snakes, however (all venomous, although rarely deadly), produces many punctures like that of the harmless land snakes

It usually happens that when a person is bitten he is far from any medical help. In such a case the best treatment, in the absence of any newly discovered injections, is to apply immediately a ligature—that is, a strong string, handkerchief, or narrow strip of clothing—tied round the limb above the bitten part, or ligatures at intervals of a few inches, as tight as you can possibly tie them. Tighten that nearest the wound by twisting it with a stick. The great pain and swelling produced cannot be avoided. Scarify wound, which should be sucked long and freely; then apply hot iron or live coal, or explode some gunpowder on it; or apply carbolic acid, or some mineral acid or caustic. If bite be on a spot where ligature cannot be applied, as on the neck or face, pinch up the bitten parts between the finger and thumb and cut part out completely, and *at once*. Keep the patient quiet, and obtain medical assistance where possible. Give sal volatile, carbonate of ammonia, spirits, wine, or other stimulant—a few teaspoonsful at a time; if not handy, strong tea or coffee may be substituted.

Vegetable Pathology.

DISEASE IN TOMATOES.

By HENRY TRYON.

[It having been brought under the notice of the Secretary for Agriculture that the disease known as "Black Rot" was causing great losses to the fruit-growers of the Redland Bay district, instructions were at once given to the Government Entomologist to examine the examples of affected fruit forwarded by Mr. L. Hugonin, of Ormiston, and to report upon the disease, as illustrated by them and its causes, and to suggest remedial measures.

The following communication was made by the officer in question, and we much regret that we received it too late for insertion in the succeeding number of the *Journal*.—Ed.]

SYMPTOMS.—The symptoms of disease presented are as follow:—At the crown end of the fruit, and including within its borders the callous area within which the base of the style occurs, a patch of dark-brown discolouration is met with, that is suggestive of some effusion beneath the skin. This varies in its extent in individual specimens, from being of so small a size as to be scarcely discernible to being two or more inches across. In the latter event the affected surface is of a darker hue than when the disease is less pronounced, and more or less flattened and collapsed, the fruit, in fact, appearing as if its summit had been cut off and the injured part had afterwards "healed over." When these appearances are well developed it will be found on cutting across the fruit that the dark discolouration extends inwards to the centre of the fruit, and that the affected tissues, though compact, are in a state of rottenness.

CAUSE.—Although at present there is no outward development of any special fungus organism in connection with these examples of diseased fruit, it can be concluded from the facts already within the experience of the writer that it is a so-called parasitic disease. In connection with similarly affected fruit, several different fungi have, on other occasions, been observed. These have been referred to the genera *Cladosporium*, *Macrosporium*, *Phoma*, *Helminthosporium*, *Glæosporium*, *Monilea*, *Fusarium*, and others. Of these the first three probably represent successional stages in the life-history of a single parasite. Bacteria of more than one kind are, moreover, to be met with in the tissue implicated in the disease.

Other writers have attributed an evidently similar diseased condition of the tomato fruit to the attacks of one or other of these fungi acting independently. I am not, however, aware that such a connection as is alluded to has been established in the case of any one of them by crucial experiment, and, personally, disease has only been produced in a sound fruit by inoculation with the spores of *Monilea fructigena*. Apart from any such investigations relating to the action of fungi, there have been the numerous inoculation tests of these organisms yielded by diseased fruit, with bacteria derived from artificial cultivations conducted by Professor Arthur. These, however, were not attended by any positive results.

INFECTION.—The developmental history of the malady indicates that the fruit becomes infected by the disease in at least two different ways. In the first place the fungus-spores find a lodgement at the site of some mechanical injury, such as, for instance, that arising from the gnawing or puncturing of insects. (In the case of the specimen of tomato fruit, amongst those submitted, in which the disease is obviously most pronounced, infection has evidently originated through the attacks of a caterpillar of a common noctuid moth named *Heliothis armiger*). In other instances infection is doubtless effected at the style, when this having dried up on the setting of the fruit has become broken across. In this event the disease may originate when the fruit is quite small, but in the former case at any period during its growth towards maturity.

WHENCE INFECTION PROCEEDS.—The spores of the parasitic fungus or fungi, that in the course of their growth originate the disease, are furnished for the most part by tomato plants and tomato fruit already affected. In the case of the *Macrosporium* fungus, such infection may be traceable to the existence on the leaves of the tomato plant of dark-brown blotches, spots, or specks; since the fungus not only is met with upon the fruit, but lives also in parasitic relation with the foliage also, and displays its presence, moreover, when occurring thereon in association with such marks of discolouration. This source of infection may be especially operative when the fruit is still green, and in fact but little developed. Already unsound fruit constitutes, however, the principal source whence dissemination of the malady arises.

PREDISPOSITION.—In the condition and habits of growth of the tomato plant itself will be found further cause that contributes towards the occurrence of the disease, it being especially prevalent when, owing to a dense growth of leafage that it may be allowed to present, or when by its being suffered to cumber the ground, its immediate surroundings are warm and humid. Increased vigour—induced by cultural procedures proper, rather than by the exhibition of nitrogenous fertilisers—favours, *cæteribus paribus*, the absence of the disease; whereas the reverse condition to this contributes to its presence.

TREATMENT.—With regard to measures to be adopted in view of the occurrence of this tomato affection, it may be remarked that its nature is such as to render all efforts in the direction of curative treatment wholly inoperative. It may, however, be to some extent prevented. To accomplish this—

- (1) The plants should be thoroughly sprayed with a fungicide—*e.g.*, Bordeaux Mixture. The application of this wash, moreover, should be commenced soon after the fruit has set, and, owing to the rate of rapid growth that characterises the tomato, repeated at frequent intervals—*e.g.*, after every ten days have elapsed. The occurrence of black spots on the leaves should, of course, suggest resort to this application forthwith; but it is desirable that this event be not awaited to the exclusion of still earlier action. The adoption of the trellis method of growth facilitates the procedure.
- (2) As soon as fruit be present the plants should be frequently systematically gone through, and all fruit that—owing to the presence of injury, howsoever arising, disease, sunscald, excessive ripeness, &c.—presents a condition such as to suggest its immediate or ultimate inavailability for market requirements, should be destroyed. By carefully prosecuting this procedure the additional result of arresting the increase of any tomato-injuring insects will be simultaneously accomplished.
- (3) When the fruit has been gathered or occurs in such limited quantity as to render the further occupancy of the ground by the plants yielding it unprofitable, the latter should be rooted out, and as soon afterwards as practicable burnt.
- (4) The plants, again, from the commencement of their growth onwards should be encouraged by suitable horticultural devices and procedures—that are not within the writer's province of work to describe—to manifest an open and upright habit of growth.
- (5) Insomuch, finally, as certain varieties of tomatoes have the reputation of being little if at all affected by disease of the nature of that that has been alluded to, attention might be given to their exclusive cultivation by way of substitutes for a season, with a view to obviate the perpetuation of the malady that continuous cultivation of susceptible varieties might be expected to favour.—*Department of Agriculture*, 27 Nov., 1900.

Animal Pathology.

TELEGONY.

An ounce of experience is worth a pound of theory, and although one would naturally feel some diffidence in discounting physiological theories as propounded by such eminent scientists as Professor Ewart and Mr. Tegetmeier, yet facts are stubborn things, and it has been shown that in numerous instances the offspring of purebred animals have shown a variation in type or markings when their dams had been impregnated by sires which had been recently in use amongst alien females.

Mr. W. Goodwin, in an article in the *Live Stock Journal* (London), says:—

I think it would be well if experiments were undertaken by some unbiassed persons to set at rest the question of such possible contamination of sires, and whether or no this could affect their after progeny. Such experiments might very easily be conducted, and would afford breeders an opportunity of judging whether the opinions of practical men are of any value as against the theories of scientists. They would afford data, likewise, which might prove of great benefit to agriculturists and live stock breeders.

Whether the instances which have come to my knowledge of the apparent influence of alien females upon a sire and his succeeding progeny would justify me in becoming a disciple of "Telegony Run Mad," I will not attempt to decide, but I have had a herd of the purest bred Small White pigs which never showed a spot of colour until the boars were allowed to serve Berkshire sows, after which many of the young came spotted and marked, and one had a black nose. In like manner a friend who had a choice herd of black Essex, of which he was particularly careful, had to his dismay several litters of young pigs splashed with white after he had allowed a neighbour's white sow to visit his boar.

The same noted breeder, whom, to show his standing, I may say was at one time the part owner of the 1,500 guineas Shorthorn bull Eighth Duke of York, had a chestnut pony sire, which after serving a gipsy's skewbald mare produced a foal with skewbald markings out of a brown mare which had previously borne several self-coloured foals to him.

One other instance I adduce, that of a high-bred herd of Shorthorn cows, which were kept on a gentleman's estate at Hales Hall, where a Jersey cow was also kept for the use of the house till it was noticed that the calves sired after the service of the Jersey were born with brown noses; and this, as I saw myself, was the case after the use of two different bulls. The Jersey, the best I ever met with, was sold on this account; and it is at least strange, if sires are never influenced by the females with which they mate, how these peculiar circumstances could have arisen.

HYGIENE ON THE FARM.

A habit often met on the farm is that of stopping hæmorrhage or bleeding by means of old cobwebs gathered in sheds, stables, and other similar places. According to Dr. Coulomb, such habit is a very dangerous one. Cobwebs are full of all sorts of mischievous microbes which not seldom produce infectious diseases. He quotes frequent cases of smallpox, typhus, tetanus or lockjaw, &c., caused in both man and beast by the use of cobwebs.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.		1900.										
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
<i>North.</i>													
Bowen ...	Nil.	2.92	7.61	0.40	0.88	0.59	0.89	1.14	0.96	0.76	0.12	0.31	0.05
Cairns ...	0.33	4.57	43.06	1.98	8.90	3.77	3.56	1.66	0.20	Nil.	2.44	1.52	1.61
Geraldton ...	Nil.	4.89	62.26	2.36	8.86	8.86	8.33	2.34	1.02	Nil.	2.63	3.17	2.39
Herberton ...	2.75	0.73	11.90	0.23	1.97	2.19	0.57	0.12	0.98	Nil.	0.74	Nil.	3.11
Hughenden ...	1.05	0.33	6.43	1.04	0.01	Nil.	0.11	0.02	2.45	Nil.	0.14	Nil.	0.10
Kamerunga ...	...	...	...	1.01	8.60	3.25	3.65	Nil.	0.18	0.03	1.42	1.98	1.28
Longreach ...	0.67	Nil.	1.68	0.48	Nil.	Nil.	0.14	Nil.	2.34	0.50	Nil.	Nil.	0.19
Lucinda ...	1.26	1.02	37.35	1.71	4.90	4.44	9.08	1.10	1.04	0.08	0.44	1.33	0.88
Mackay ...	0.49	7.65	20.86	0.65	4.12	2.40	2.89	2.00	3.25	0.74	1.19	0.48	0.12
Rockhampton ...	1.22	11.02	4.53	0.25	1.64	0.93	1.38	0.71	1.70	0.92	2.52	0.53	1.15
Townsville ...	0.16	0.53	21.09	0.07	1.68	0.87	2.31	0.41	0.57	0.12	0.25	0.91	0.05
<i>South.</i>													
Barcaldine ...	0.52	0.04	3.08	0.65	0.09	2.03	1.38	0.29	4.38	1.63	0.03	Nil.	0.30
Beenleigh ...	1.80	7.40	5.42	3.19	3.16	1.25	7.55	2.18	4.77	1.06	1.90	0.26	2.80
Biggenden ...	...	...	...	0.40	2.81	0.28	3.06	1.43	3.23	0.98	3.07	0.87	1.65
Blackall ...	0.04	0.85	1.73	1.31	0.63	0.63	2.19	0.33	2.21	0.66	0.12	Nil.	0.29
Brisbane ...	2.33	7.61	6.51	5.18	3.37	1.38	5.45	2.68	4.36	0.79	1.52	0.14	2.48
Bundaberg ...	0.06	7.62	4.63	0.86	1.86	1.15	3.97	1.46	5.20	1.14	1.56	3.05	1.06
Caboolture ...	2.23	7.44	3.04	4.18	5.66	1.42	7.04	2.14	3.73	1.56	2.94	1.99	0.86
Charleville ...	0.43	0.16	1.01	0.08	0.79	Nil.	1.15	1.31	1.80	0.13	0.59	0.13	0.19
Dalby ...	1.84	2.89	0.41	6.31	2.80	2.46	2.54	1.29	1.70	1.72	1.67	Nil.	1.77
Emerald ...	1.32	0.40	3.08	1.22	3.97	0.42	2.72	1.15	3.96	0.52	0.35	0.18	0.31
Esk ...	2.25	5.34	1.42	2.34	4.73	1.50	4.78	1.89	2.85	1.39	...	Nil.	1.35
Gatton College ...	3.50	5.87	2.40	4.07	3.13	2.24	4.24	1.15	2.73	1.33	2.81	Nil.	4.12
Gayndah ...	4.59	7.37	2.52	2.07	1.11	1.22	2.57	0.88	3.36	1.42	3.28	3.21	1.84
Gindie ...	...	...	...	0.57	1.04	0.96	3.01	0.92	3.01	0.55	0.22	0.27	0.49
Gympie ...	0.39	6.44	5.59	1.84	2.76	1.05	3.63	0.82	3.34	0.84	5.67	0.18	0.84
Ipswich ...	3.46	4.66	2.79	1.66	1.85	1.47	4.73	1.45	2.25	1.17	1.37	0.01	3.93
Laidley ...	2.40	6.50	0.64	3.15	2.87	1.94	4.36	1.41	2.23	1.08	...	Nil.	4.55
Maryborough ...	0.51	4.13	4.88	1.78	3.26	1.17	4.33	1.21	4.32	0.57	3.55	1.22	0.68
Nambour ...	3.03	11.11	4.07	5.64	4.67	2.78	7.77	1.35	3.42	1.81	4.15	0.52	1.91
Nerang ...	1.42	6.31	4.60	3.37	3.06	0.47	18.28	2.84	7.74	1.08	2.79	0.26	3.02
Roma ...	1.27	0.99	0.43	1.52	4.40	0.23	2.07	2.14	2.14	1.05	0.77	0.66	2.20
Stanthorpe ...	0.86	3.22	2.62	4.81	1.87	1.70	3.17	1.22	2.26	1.50	3.98	0.23	2.17
Taroom ...	3.32	0.65	1.78	3.65	2.92	2.11	2.55	1.40	2.46	2.92	2.26	1.47	0.45
Tambo ...	0.08	0.66	2.28	1.55	0.30	0.02	2.94	1.49	1.75	0.59	0.19	Nil.	1.87
Tewantin ...	0.46	8.22	1.69	4.87	5.36	1.02	5.90	3.03	5.89	1.97	5.78	1.48	0.74
Texas ...	0.74	2.67	1.56	3.39	1.63	1.48	3.35	1.86	2.72	0.66	2.68	0.35	2.67
Toowoomba ...	2.36	4.75	1.01	2.90	2.87	2.00	4.67	1.69	2.47	1.35	1.95	0.43	2.42
Warwick ...	1.67	3.83	1.84	4.19	1.93	1.01	3.31	1.23	1.99	1.11	2.72	0.13	2.01
Westbrook ...	...	...	...	3.71	1.78	1.81	3.04	1.16	1.85	1.18	0.60	0.04	4.59

ARCHD. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, choicest, 110s. to 112s.; second quality, 96s. to 106s.; Danish, 116s. to 126s.; Canadian, 100s. to 104s. per cwt.

CHEESE.—American, 52s. to 54s.; Canadian, 53s. to 55s.; New Zealand, 53s. to 55s.; Queensland, 54s. per cwt.

SUGAR.—Refined, £12 10s. to £16 10s. per ton; German beet, 88 per cent., 9s. 8 $\frac{3}{4}$ d. per cwt.

SYRUPS.—Finest, 24s. 9d. per cwt.

MOLASSES.—5s. 3d. to 6s. 6d. per cwt.

RICE.—Rangoon, £8 10s. to £13 10s.; Japan, £12 to £17; Java, fine to finest, £12 10s. to £26; Patna, fine, £13 to £22 per ton.

COFFEE.—Ceylon Plantation, 97s. to 116s.; Peaberry, 80s.; Santos, 40s. to 62s.; Mocha, 85s. to 108s. to 135s.; Jamaica, 50s. to 91s. to 130s. per cwt.

ARROWROOT.—St. Vincent, 2½d. to 6d.; Natal, 7d. to 8d.; Bermuda, 1s. 2d. to 2s. per lb.

WHEAT.—Australian, 31s. per 496 lb.; Duluth, 34s. 3d.; Manitoba, 34s.

MALTING BARLEY.—English, 24s. to 38s. per 448 lb.; Californian, 25s. to 27s.

OATS.—New Zealand, 26s. to 30s. per 384 lb.

SPLIT PEAS.—42s. to 53s. per 504 lb.

GINGER.—Jamaica (rough), 48s.; good, 85s.; finest, 110s. to 140s. Bengal (rough), 29s. to 30s. Japan, 25s. to 28s. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; chillies, 65s. to 75s. per cwt.

TOBACCO.—Virginia Leaf: Common to middling, 2½d. to 6d. per lb. colory and good to fine, 4½d. to 1s. 1d. Strips: Common to middling, 4d. to 8d.; good, fine, and colory, 8d. to 1s. 3d. Kentucky Leaf: Common to middling, 2½d. to 5½d.; colory, good, and fine, 7½d. to 9½d. Strips: Common to middling, 3½d. to 7½d.; good and fine, 8d. to 11d. Maryland and Ohio, 4½d. to 10d. Negrohead and Cavendish: Common and heated, middling to good, fine, bright and soft pressed, 4d. to 1s. 3d. Columbian, 3d. to 2s.; Java, 4d. to 10d.; Turkey, 4d. to 11d.; Japan, 5d. to 8½d.; China, 5d. to 7d.; Sumatra, 7d. to 5s.; Latakia, 4d. to 11d. nom.; Paraguay, 3d. nom.; Greek, 3d. to 5d.; German and Dutch, 4d. to 1s. 4d.; Manilla, 3d. to 4s.; Havannah, 8d. to 5s.; Cara and Cuba, 5d. to 2s.; Esmeralda, 7d. to 10d.; cigars, 1s. 3d. to 40s.; cheroots and cigars, Manilla, 2s. to 3s.

WINE.—Australian Burgundy: Wootonga, red, 13s. per dozen bottles to 17s. per dozen quart flagons; Waratah, red, 18s. to 23s. per dozen; fair red Australian claret, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon.

GREEN FRUIT.—Apples, Nova Scotia, 12s. 6d. to 17s. per barrel; pears, 100-lb. hampers, 9s. 6d.; California pippins, boxes 40 lb., 10s.; bananas, 10s. 6d. to 12s. per bunch; pineapples, 3s. to 5s. each. Grapes: Barrels, about 63 lb., choicest, 18s. 6d.; other, 15s. to 16s. Oranges: Boxes of 100, 8s. to 17s. 6d., 420's selected. Lemons: Malaga 500's, 13s. 6d.; Messina 360's selected, 16s. 6d.

COTTON.—Sea Island, in Florida, in the seed, 2d.; ginned, 8d. Clean uplands, in London, 7d.; in Japan, 5d. per lb.

COTTON WASTE.—21s. to 30s. per cwt.

COTTON-SEED.—£7 12s. 6d. to £9 per ton. Cotton-seed oil, refined, £22 10s.; crude, £20 per ton.

OILCAKE.—Cotton-seed, £4 10s. to £5; decorticated, £7 15s. per ton.

EGGS.—French, 11s. 6d. to 13s. 6d. per 120; Italian, 10s. 6d. to 11s. 6d.; Russian, 7s. 6d. to 8s. 6d.

HONEY.—Finest Jamaica, 32s.; finest Irish, 42s.; Australian, nominal, 26s. per cwt.

BEESWAX.—1s. 2d. to 1s. 8d. per lb., or £6 10s. to £9 6s. 8d. per cwt.

LINSEED.—58s. to 60s. per 416 lb.

LINSEED OIL.—32s. per cwt.

LINSEED CAKE.—£8 12s. 6d. to £9 per ton.

OLIVE OIL.—£33 to £39 per ton; eating oil, £50; Lucca oil, 3s. 9d. to 5s. per gallon.

HEMP.—Riga, £34; sisal, £23; ramie and ribbons, £15; New Zealand, £21½ per ton.

RUBBER.—Para, fine, 4s. 1d. to 4s. 1½d. per lb.; West Indian, 2s. to 2s. 10d.; Mozambique, 2s. 6d. to 3s. 3d.

WOOL.—London Sales: The sales opened on the 15th January, with a large attendance of buyers, at an average advance of about 5 per cent. on last sales' closing rates for merino and crossbred. Coarse crossbred market unchanged. Competition by both home and foreign buyers was fairly active.

FROZEN MEAT.—The following are the latest London quotations (12th January) for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.

(Crossbred Wethers and Merino Ewes.)

			Jan. 5.	Jan. 12.
Canterbury	...	...	4 13/16d.	4 13/16d.
Dunedin and Southland	...	...	4 11/16d.	4 11/16d.
North Island	...	...	4½d.	4½d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	...	...	3 15/16d.	4d.
Light (under 50 lb.)	...	...	3½d.	3 11/16d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	...	...	...	4d.	4 1/16d.
Light	...	...	...	3¾d.	3¾d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	}	None offering
Fair average		

Australian Lambs.

Prime (32 lb. to 40 lb.)	...	5½d.	5½d.
Fair average	...	4¾d.	5d.

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.)	3¾d.	3¾d.
Ox, hinds (180 lb. to 200 lb.)	4d.	4d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (160 lb. to 200 lb.)	3 3/16d.	3 3/16d.
Ox, hinds (160 lb. to 200 lb.)	3 9/16d.	3 9/16d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies or inferior quality. Messrs. Weddel and Co. anticipate that fairly high values will be maintained for all imported meats for some months to come.

BACON.—Irish, 63s. to 68s.; American, 48s. to 60s.; Canadian, 56s. to 61s. per cwt.

HAMS.—Irish, special brands, 90s. to 108s.; Canadian, 56s. to 64s.; United States, 46s. to 58s. per cwt.

HIDES.—Supplies large; a good demand.

TALLOW.—Mutton, fine, 28s.; medium, 26s. per cwt. Best beef, 26s. 6d.; medium, 25s. per cwt.

RAINFALL IN THE SPRINGSURE DISTRICT.

Month.	1887.		1888.		1889.		1890.		1891.		1892.		1893.	
	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.
January ...	7.72	11	5.36	5	0.44	4	3.91	11	9.22	18	2.12	8	1.93	7
February ...	6.26	11	5.66	12	0.59	5	11.26	12	0.88	3	1.05	4	3.55	11
March ...	7.36	10	0.19	1	1.71	7	8.26	18	4.92	11	1.70	5	2.72	8
April ...	1.72	4	0.05	1	5.65	10	1.32	8	3.22	6	0.76	3	1.81	7
May ...	1.07	4	0.53	2	1.54	8	4.90	7	2.10	5	3.63	7	2.04	5
June ...	0.86	4	Nil.	...	0.97	4	1.80	6	3.27	3	0.03	1	4.28	9
July ...	1.08	4	Nil.	...	2.58	5	1.05	5	0.24	2	0.37	5	4.27	5
August ...	3.45	5	0.53	1	0.52	3	0.04	1	1.86	2	0.04	1	4.14	5
September ...	1.26	4	0.23	1	2.03	3	3.83	5	0.26	4	2.60	7	0.33	2
October ...	0.24	1	1.15	2	1.53	5	2.04	7	1.19	6	5.18	7	1.07	5
November ...	0.66	5	1.10	4	5.06	11	0.54	4	2.00	6	1.42	3	0.58	2
December ...	3.24	9	0.48	4	4.53	8	3.75	13	4.48	9	1.26	9	0.04	1
Totals ...	34.92	72	15.28	33	27.15	73	42.70	97	33.64	75	20.16	60	26.76	67

Month.	1894.		1895.		1896.		1897.		1898.		1899.		1900.*	
	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.	IN.	W.D.
January ...	5.45	9	9.68	18	6.35	8	2.78	10	4.57	10	4.92	12	3.41	11
February ...	3.45	10	4.66	7	10.63	22	1.83	5	11.34	18	2.31	6	0.68	3
March ...	7.86	10	0.14	1	1.48	2	2.42	4	1.29	7	2.27	9	2.28	7
April ...	3.53	6	5.14	2	1.93	3	Nil.	...	0.05	2	2.12	5	0.47	3
May ...	1.71	5	1.33	5	0.69	2	Nil.	...	0.49	3	1.47	3	3.96	6
June ...	5.55	3	0.07	1	0.39	3	3.96	3	1.15	6	0.24	4	1.15	2
July ...	0.06	1	1.77	8	2.91	7	0.09	2	0.35	3	1.79	9	5.73	8
August ...	0.42	4	0.04	1	1.06	2	1.97	3	1.50	5	2.38	3	0.88	5
September ...	1.93	6	0.20	1	0.56	1	0.68	6	1.89	6	1.32	4		
October ...	3.01	7	0.67	7	0.13	3	3.89	10	1.00	3	2.19	9		
November ...	1.78	6	3.59	8	1.66	7	2.37	5	0.82	5	1.29	5		
December ...	4.14	9	4.72	10	0.89	5	1.36	8	5.89	8	0.22	3		
Totals ...	38.89	76	32.01	69	28.68	65	21.35	56	30.34	76	22.52	72	...	...

* 18.56 inches for 45 days.

Agricultural Patents.

Patent Office, Brisbane, 12th December, 1900.

The undermentioned applications for patents have been received at the Queensland Patent Office:—

WHEELS WITH FLEXIBLE RIM AND ELASTIC HUB.—Application No. 5563: George Garibaldi Turri, of Salisbury Buildings, Queen street, Melbourne, Victoria, patent agent. “Improvements in Flexible Rim Wheels” Dated 2nd July, 1900. (Drawings, 30s.; specification, 10s. 6d.) The flexible rim is attached by wire spokes to hub-discs sliding axially on the axle box, and held apart by compression springs, of which three styles are described. Rotation is transmitted from the axle box to the wheel by ball-filled grooves, which act both as keys and as sliding bearings.

General Notes.

CURING AN EGG-EATING DOG.

Many and various have been the recipes given as a certain cure for a dog gifted with egg-eating propensities, but we can recal but one remedy which has proved effectual—a shot-gun. A new idea, however, has struck someone with a chemical turn of mind. Possessed of a dog, one probably too valuable to destroy, which was in the habit of hunting for hens' nests and making a clean sweep of the whole contents, he tried a new plan. He blew an egg and filled it with strong spirits of ammonia, carefully plugging the apertures. This egg he placed among others in a nest well-known to the dog, and awaited developments. In due time the egg-eater discovered the prize and proceeded to business, but when he crunched up that egg he sneezed, coughed, gasped for breath, fell down and writhed several times, and at last, when he had after ten minutes sufficiently recovered to proclaim his unutterable bliss, he fled and would never afterwards look at an egg. This is a simple remedy worth trying.

TO PICKLE FISH.

Dress the fish, splitting clear through to the backbone the entire length, and removing the backbone if you wish. Wash off the blood, and put down a layer of salt and a layer of fish, so that the layers of fish will not touch one another. Do not put in any water; the fish "make their own brine," as the fishermen express it.

TO PICKLE ONIONS.

Put the onions, which ought to be very small and perfectly sound, into a large bowl, and cover them with hot water; then, when sufficiently cool to handle, peel them very carefully, so as not to cut the bulb, and as they are peeled throw them into another bowl containing brine strong enough to float an egg. Let them remain in this until next day, then strain off the brine, dry the onions between two clean, soft cloths, return them to the dry bowl, and cover them entirely with boiling white wine vinegar, allowing half-a-teaspoonful of coriander seed, an inch of whole ginger, and an ounce of peppercorns to every quart. Next day pour off the vinegar, reboil it, and again use it to cover the onions. This should be done twice; then the onions should be put into small, thoroughly dry jars or bottles, and covered entirely with the vinegar, which has been strained and allowed to cool. When quite cold, cork securely, cover the tops with bladder, and store in a cool dry place for three or four weeks before using.

TO PICKLE BEETROOT.

Take the requisite number of freshly dug beetroots, and, after gently washing them and brushing off the soil so as not to break the skin or any of the small tendrils, boil them in the usual way until sufficiently tender; then peel them, cut them in slices about a quarter of an inch thick, and put them into jars. Boil a sufficient quantity of vinegar to quite cover the beetroots, allowing to every quart half-an-ounce each of bruised ginger, peppercorns, mace, salt, and cloves; then, when well-flavoured, strain, cool, and pour it into the jars, which should be covered in the usual way. This pickle may be used at once, and will not only prove a most appetising accompaniment to cold meat, but also a very popular addition to a vegetable salad, and a great help in the garnishing of various cold dishes.

TO PICKLE RED CABBAGE.

Choose the cabbages very firm and sound, and after they have been slightly frost bitten; then remove the outer leaves, and cut the hearts crosswise in very fine shreds, the finer the better; spread these out on a large shallow dish, sprinkle freely with salt, and leave in a cool place for twenty-four hours, after which drain away all the liquid, place the cabbage in jars, cover with cold vinegar, which has been boiled gently for about ten minutes with ginger and peppercorns in the proportions already given for onions, and tie down securely. This pickle may be used at once.

CURRY POWDER.

Many excellent Indian curry powders can now be bought, but a moderate and very good one can be made from the accompanying native recipe, the ingredients being obtainable from any good chemist:—

Turmeric, $1\frac{1}{4}$ lb.; coriander seed, 10 oz.; cummin seed, 8 oz.; dried chillies, 1 oz.; fenugreek, 1 oz.; dried ginger, 2 oz. All the ingredients to be pounded and well mixed. Store in tins, and keep in a dry place.

SORE SHOULDERS.

The following is a good lotion to apply to sore shoulders, two or three times a day:—Alum, 1 drachm; sulphuric acid, 1 drachm; water, 1 pint. Dissolve the alum in the water, and then add the sulphuric acid. Apply with a sponge or soft rag. If the shoulders are very raw it will be well to use a lotion made by dissolving 1 drachm of sulpho-carbolate of zinc in 4 oz. of water until the wounds are nearly healed, and then commence with the alum lotion, as that is more for hardening the skin than healing wounds. If the horse is obliged to work before the shoulders are healed, a chambered collar should be used.

CURE FOR WARTS.

A correspondent says that wart on a cow's teats may be cured by the application of molasses twice a day.

CURE FOR CROP-BOUND FOWL.

As most people shrink from operations, I am sending a method of curing crop-bound fowls without the use of the knife. Get a piece of window glass, or any ordinary glass; put it on the fire till it bends. Take it out, and plunge it into cold water, when it will crumble up quite easily with a tap of the hammer. It makes good sharp grit, but will not injure the crop in the least. Give the sick bird one and a-half teaspoonsful of this, then a teaspoonful of salad oil; start and work the crop about gently with the hand, and continue doing so until it is quite pliable in every part. Shut the bird up with nothing to eat, and, if its crop is not empty in twelve hours, repeat the dose, and keep without food until it is. I have never known the second dose to fail.—J. BUNNAGE.

VALUE OF FOWL MANURE.

Four hundred pounds weight of hen manure is equal in value to 2,400 lb. of farmyard manure. In a ton of fowl manure analysis showed 48.60 lb. phosphoric acid, 48 lb. potash, and 67 lb. nitrogen; whilst farmyard manure contained only 6 lb. phosphoric acid, 10 lb. potash, and 11 lb. nitrogen in one ton. Much of the value of any manure depends upon its freshness, and whether it has been kept under cover and dry.

TOMATO DISEASE.

If tomato plants show signs of disease by the unhealthy appearance of the leaves or scabby fruit, they should be at once sprayed with Bordeaux mixture of a strength of 4 lb. bluestone (sulphate of copper), 1 to 6 lb. quicklime, and 40 gallons of water.

INSURANCE AGAINST DAMAGE FROM HAILSTORMS IN SWITZERLAND.

Private and State insurances against damage from hail exist in nearly every Swiss canton. In recognition of their usefulness and as an encouragement, the Federal Government of Switzerland has assigned a £ for £ endowment of 140,000 francs to be distributed between the twelve Cantonal Governments which support or subsidise such insurances.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Answers to Correspondents.

BIRD-LIME.

P. M., Warwick.—Bird-lime was at one time made from a decoction of mistletoe, but it can be easily made by boiling down linseed oil. If boiled oil is used, the concentration will take less time than with unboiled oil. The proper way to bring it to a right consistency is to treat it as glue is treated. Put the oil into a tin, place the tin in a saucepan of water over the fire, and let it boil slowly.

STACK ENSILAGE.

J. K., Brown's Plains.—An excellent paper on stack ensilage by Mr. Aubin Dowling, Talgai West, appeared in the January number of this *Journal*. It is not absolutely necessary to build silos, as it is shown that by taking proper precautions the stack is equally effective. Neither are any appliances required for the purpose of applying pressure. A covering of straw is sufficient, with a couple of wires weighted with stones to keep the straw from blowing off.

WEIGHT OF HORSES' SHOES.

BLACK SOIL, Laidley.—Yes. It has been proved that the plough horse is, as a rule, shod with too heavy shoes, and that the animal could do more work with less fatigue if lighter ones were substituted. The lighter shoes might be required to be renewed oftener, but this expense would be compensated for by the extra amount of work done. A horse weighing 1,100 lb. should be shod with shoes of from 12 to 15 oz. each. A ploughman, wearing 3½-lb. boots, travelling 9½ miles, lifts over 16 tons of shoe leather in addition to the extra

amount of dirt lifted. In the case of the horse, if 4 oz. are added to each shoe, the total difference in the animal's shoes is 16 oz. In ploughing, cultivating, mowing, and reaping, a farm horse will walk from 10 to 20 miles a day. If it takes about 4 feet each step, the horse will lift about $\frac{1}{2}$ -lb. extra on its two feet, or 600 lb. to every mile. If we make the average day's work 15 miles, the horse will lift 9,900 lb. extra a day, or nearly 5 tons. The energy required to lift this amount is wasted, and serves no useful purpose. If it could be expended in doing extra work that would pay, it would nearly pay the animal's keep. Leg-weary horses are common on the farm, and leg-weary horses are apt to break down in time and have crooked and ailing limbs. It is not only a matter of humanity, but one of profit to lighten the horse's burden.

YIELD OF TEA.

TEA-GROWER, Logan.—The literature of the tea plant is enormous, and it would be impossible to condense any treatise on tea-planting into a few lines. Lieutenant-Colonel Money's book and the essay by Mr. W. R. Robertson, Superintendent of Government Farms, Madras, India, are standard treatises on the subject. But the very latest and thoroughly reliable information on all that concerns the cultivation and manipulation of tea is to be obtained from the *Tropical Agriculturist*, Colombo, Ceylon. The latter journal states that in one district of Ceylon a 100-acre field has, for the past fourteen years, yielded an average of 1,137 lb. of tea, whilst over a whole estate of 450 acres about 930 lb. per acre have been made.

WARTS ON CATTLE.

M. CULLEN, Homebush, Mackay.—The particular wart disease you write about is defined by Mr. W. C. Quinnell, M.R.C.V.S.L., as *Verrucæ*—agglutinated epidermal scales overlying the hypertrophied papillæ of the true skin as a result of "tick" irritation. Owing to the warts being numerous and generalised, curative treatment is rendered impossible.

Farm and Garden Notes for March.

FARM.—Continue to plough up land. Sow lucerne, clover, rye grass, oats, barley, vetches, prairie grass, mangolds, and Swede turnips. Get in the main crop of potatoes. A good old rule used to be to have the potato-planting over by the 17th of the month. Weeds will now be giving less trouble; hence lucerne may safely be sown, weather permitting, on well-tilled, deeply-cultivated land. The latter should be rich and friable with a porous subsoil, and should have been thoroughly well prepared during the past two months, care having been taken to plough and cross-plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. Should weeds still appear before the plants have sent down their tap-roots, mow the field. By so doing, before the weeds can come up again to do damage, the lucerne will be strong enough to make head against them. The field should then be harrowed and rolled. Gather all ripe maize and tobacco. Let the tobacco leaves wilt on the ground before hanging them up in the curing-shed.

In Northern Queensland sow tobacco seed. Continue planting sweet potatoes. Sow cow pea, trash sugar-cane, harvest paddy (rice), keep the yam patches clean, and harvest Kafir corn. Kola-nut cuttings may be planted out, and Jack fruit and anatto sown. Coffee-planting may be proceeded with. Some temperate zone vegetables and potatoes may be sown. Granadillas for a crop, water-melons, opium-poppy, and buffalo grass may be got in.

KITCHEN GARDEN.—The summer is virtually over on the 20th of March, but it is possible that weeds in rich garden soil will still give trouble. They must, therefore, be kept down by constant hoeing. Now is the time to sow most of the winter crops, and market gardens will have a busy time. Whenever the soil is in good condition for sowing—that is, when it is moist and mellow from previous rain—sowings should be made of the following vegetables:—Broad beans, peas, turnips (Swede and White Stone), carrots, parsnips, onions, beet, spinach, and radish. Sow these in drills 2 to 3 feet apart. When transplanting, be careful to retain a ball of earth at the roots of the plants when lifting them. Plant cabbages, if on a slope, in rows across the hill. Sow the following in seed beds:—Celery, lettuce, parsley, cabbage, cauliflower, kohl-rabi, Brussels sprouts, endive, leeks, and herbs of all sorts. Transplant eschallots and plant potatoes. Nearly all European vegetables may be safely sown during this month. If the young plants are attacked by grubs, spray with Paris green. Tobacco water and tobacco dust are also excellent destroyers of grubs and slugs, especially of the great slug *Agriolimax*, described and illustrated by Mr. H. Tryon, Entomologist, in this *Journal* (Vol. V., page 63, July, 1899). Tobacco waste also forms an excellent fertiliser, and can be procured at the factories at 5s. per load. Lay it out on the surface in the form of a ring round the bed it is desired to protect. This is about the best time to plant strawberries. Select strong healthy runners, and water, if necessary, till they become established.

FLOWER GARDEN.—The following notes are supplied by Mr. P. Mac Mahon, Curator of the Brisbane Botanic Gardens:—

Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. The following genera may be selected from, and amongst them will be found many hundreds of interesting species and varieties. I have not followed strict botanical nomenclature, giving popular names occasionally:—*Allium*, *Alstroemeria*, *Amaryllis*, *Anemone*, *Arum*, *Babiana*, *Brodiaea*, *Bulbocodium*, *Calochortus* (Mariposa lilies), *Canassia*, *Choinodoxa* (Glory of the Snow), *Cliveia*, *Colchicum*, *Crinum*, *Crocus*, *Crown Imperial*, *Eranthis*, *Eremurus*, *Erythronium* (Dog's-tooth

violets), Freesia, Fritillaria, Galanthus, Galtonia (Cape hyacinth), Gladiolus, Hæmanthus (Blood-flower), Hippeastrum, Hyacinthus, Hypoxis, Jonquils, Lachenalia, Leucojum, Iris, Ixia, Lilium, Muscaria, Narcissus, Nerine, Ornithogalum, Pancratium, Ranunculus, Richardia, Schizostylus, Scilla, Sparaxis, Sprekelia (Jacobean lilies), Tigridia, Trillium, Tritelia, Tritonia, Tulipa, Watsonia. Of course there are other genera, and I will give you a chapter on bulbous plants when I get time.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Manure should be well rotted and thoroughly incorporated with the soil. The leaves of gladioli will soon be withering, and these should be lifted when the leaves become quite withered, and replanted.

All annuals and herbaceous plants which it is intended to raise from seed should be sown this month. It is necessary in sowing small seeds and in other garden work, such as preparing lawns, that the surface of the ground should be made as fine as possible, and the rakes to be purchased in the shops are seldom suitable to this purpose, being as a rule much too coarse. This is the specification for a rake which I have made for this purpose, and which acts like a charm. Take a piece of light fine-grained wood (pine or cedar) 21 inches long, 1-inch wide, and $\frac{3}{4}$ -inch thick. Get some wire $\frac{1}{8}$ -inch thick, and make twenty staples $2\frac{1}{4}$ inches long, cutting the points off square. Let the prongs of these staples be half-an-inch apart. Now bore a row of holes (forty) down the centre of the piece of wood on the widest side. Let these holes be half-an-inch apart, and of such a size that each two of them will take a staple. Now push or hammer in the staples, and the points will project through about $1\frac{1}{2}$ inches, and you will have a rake-head with forty tines having a space between each two of three-eighths of an inch. Lay the head on a bench, and tap the tines with a hammer until they all have a slight equal curve towards the direction from which you will draw the rake. Take a strip of thin zinc or tin 2 inches wide, double it down over the back to keep the staples from lifting out, and tack it to the sides. Now you want a handle, and this is secured by a long screw to the middle of the head, and a piece of strong hoop-iron passed around the head and screwed to the handle above and below, two holes being made in the iron where it crosses the head for the two teeth to pass through. The materials for this tool may be found almost everywhere, and it beats any "store" rake. It may be made finer if desired, but this is fine enough for most purposes.

Cuttings.—Put in cuttings of shrubs and all herbaceous plants. Exchange with your neighbours for varieties which you may not have. This exchange brings out the neighbourly traits which it is said a love of gardening tends to foster. We put in a great number of cuttings here, and we do it in this way: The ground is prepared and a line stretched, and the surface flattened down along the line with the back of a spade unless the ground is fairly stiff, in which case it is simply raked level. Then a trench 4 to 5 inches deep is cut with a spade, drawing the earth away from the line, the trench being in this shape—. Then the cuttings are laid in against the upright side, a little fine sand scattered along their bases and the earth firmly rammed in with the back of a rake, and the line shifted to the next row, which is always far enough apart to allow the Planet Junior to run down along and make it warm for weeds. Rose cuttings may be put in after the same fashion, but should be somewhat deeper. See my directions in a previous number of this *Journal*.

A small close frame is a most useful adjunct to the garden. Out of such a frame, 3 feet by 12, which only cost a few shillings, many thousands of plants have come during the past few years here. It should be low and close, and furnished with some simple arrangement of roller-blinds.

Cannas.—You should endeavour to get as good a stock of these as you possibly can. We have had some grand ones in flower. The blooms were like orchids, in some cases 6 to 8 inches across, and of great substance. If you have

any varieties which I have not got, I shall be glad to get some roots, and will reciprocate. This is my list, not so full as I could wish :—

Admiral Avellan, Admiral Courbet, Alphonse Bouvier, America Arthur de l'Aigle, Austria, Commandant Dubois, Comtesse de Bouchard, David Hoehnbreck, Ehmannii, Ehmannii Bruantii, Edouard Andre, F. Marmet, Fratelli Ingegnoti, Gladioliflora, Gloire de Lyon, Hybrid, Imperialis, Italia, Isaac Casati, Kaiser Wilhelm II., Koenigen Charlotte, La France, L. E. Bally, Lutea splendens, Madame Just, Madame Crozy, Miss Sarah Hill, Mrs. Cleveland, M. Sobeyrand, Parthenope, Paul Marquent, Perfection, Professor David, Progression, Queen Charlotte, Souv. de Asa Gray, Tiger, Victor Hugo, W. Pfitzer. In all, forty extremely good varieties.

Plenty of food must be given to Cannas, and waterings with liquid manure will assist them greatly.

Cuttings of carnations can be now put in; they require sandy soil.

Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds, and take measures for protecting the flowers from rain and scorching sun, but inasmuch as every grower has his own methods, by which he swears, very little need be said on this subject. A much more beautiful object than a plant trimmed for the production of exhibition flowers is a well-foliaged, flower-covered plant loosely and naturally staked out.

Dahlias are now looking well. Those in these Gardens are showing well, and they are just at that stage when a good deluging of liquid manure and a mulching of short manure would work wonders, but to know that they require this is one thing, to find the labour to do it is another. Dahlias make capital exhibition subjects, and they are well within the reach of all to grow, and easily transported and staged. It is a wonder that they are not more largely represented at Queensland flower shows. They are divided into show, fancy, bedding, and single dahlias, and the range of colours is very great. Single dahlias may be had from seeds, and a solid large bed of these will supply a great quantity of flowers of decorative value. Where there is a tendency to produce a large number of flowers it is as well to disbud to some extent; and the grower for exhibition always disbuds to secure fine blooms, and shades with specially prepared caps those which remain.

I am often asked to recommend climbers which may be planted now. A few which do well here are :—

Allamanda Schottii, beautiful yellow; Antigonon leptopus, a charming cerise-coloured climber; Aristolochia elegans, handsome as an orchid, easily grown, curious; Aristolochia ornithocephala (Dutchman's pipe), very curious, large, always attracts attention; Asparagus plumosa, grows in any shady place; Asparagus racemosus, green, close growing, covers a fence in a shady place; Beaumontia grandiflora, splendid white flower, grand for a fence, will grow to 50 feet high; Bignonia capensis, good for a fence; Bignonia venusta, a lovely creeper, will cover the roof of an ugly shed better than anything; Bougainvillea glabra, B. spectabilis, and B. splendens are magnificent climbers which soon clothe the ugliest fence with beauty; Buddleia madagascariensis, a large trailing plant good to plant over objectionable stumps, &c.; Clerodendron Thompsonii, rather delicate flowers, favourites for button-holes, &c.; Lonicera caprifolium does well here, good to cover wire netting; Mandevillea suaveolens, white, delicate; Quisqualis indica, a fine creeper, pink changing to white; Thumbergia fragrans, T. laurifolia, beautiful creepers, the latter very rank growing; Wistaria sinensis, a well-known favourite; there are hundreds of others, but you should have the above.

The mean shade temperature for March is 73 degrees, 3 degrees below the maximum mean and 15 degrees above the minimum mean.

The mean rainfall for thirty-eight years has been 6.56 inches.

The temperature is cooling off. Next month the mean will be 70 degrees.

Orchard Notes for February.

By ALBERT H. BENSON.

As this month is usually a more or less wet one, especially in coastal Queensland, the cultivation of the orchard is apt to become somewhat neglected, owing to the inability of working the land; and a heavy crop of weeds of all kinds is the result. If possible, the weeds should be kept down when young by means of one or two horse cultivators fitted with surface-working knives; but if the weather prevents this from being done, no great harm will take place if the weeds are mown down before they go to seed. The trash so obtained should be ploughed in, and will tend to maintain the supply of organic matter in the soil, and this, as has been stated frequently in this *Journal*, is of the greatest importance, as, besides rendering the soil more friable and easier to work, it increases the power of the soil to retain moisture, a most important consideration in a climate as changeable as this. In drier districts the orchard should receive a thorough cultivation after every rain, as by this means the growth of weeds will be prevented and the greatest amount of moisture will be retained in the soil. In dry districts where irrigation is available, all citrus trees should receive a thorough soaking during the month, unless there has been a fall of several inches of rain, as a thorough soaking now will carry the fruit on to maturity, provided that it is followed by thorough cultivation. In irrigating fruit trees, always give a thorough watering, say equal to 4 inches of rain all over the orchard; as this is infinitely better than giving a number of surface waterings. One thorough irrigation saturates every part of the soil, and will last for two or three months if followed up by thorough cultivation; but surface waterings dry out in a few days, and unless kept up do more harm than good. In any case, surface waterings induce the growth of surface roots, and unless these surface roots are kept well supplied with moisture they will die off, and more harm than good will be done to the tree. On the other hand, when the land is well saturated, the roots strike down, and are therefore less likely to dry out or be affected by sudden changes. The marketing of fruit still continues an important branch of orchard work. The main crop of rough-leaved pines, besides mangoes and bananas, in the Southern coastal districts, as well as the later varieties of plums and apples in the Stanthorpe district, have to be disposed of. As stated in last month's notes, every care should be taken to place the fruit on the market in as neat and attractive a manner as possible, and to see when packing it that it is free from fruit fly, San José scale, or other disease. I am sorry to say that few growers realise the importance of proper packing, as a large proportion of the locally grown fruit that comes to market is put up in anything but an attractive form. Clean cases, even grading, and neat packing always take the eye of the buyer; and fruit so got up will pay the grower handsomely for the extra trouble he has been put to, and not only that, should the market be glutted, fruit so got up will always find a sale when other fruit marketed in a slovenly manner is unsaleable.

February is a good month for transplanting mangoes and other tropical and subtropical fruit. The ground should be in thorough order, and dull or showery days, should be chosen for the work; if this care is taken, there will be little risk of failure. Plant mango seeds either in nursery row for working over next year, or, if seedlings are wanted, then in the position they are to occupy permanently. In selecting mango seeds for trees to stand permanently, choose none but those obtained from the very best fruit—fruit that is of fine flavour, large size, handsome appearance, as free as possible from fibre, as well as being a prolific variety and strong grower.

Any vigorous-growing mangoes will do for seedling stocks to be worked over, as the process of plate budding, lately described and illustrated by Mr. Horace Knight in this *Journal*, gets over the difficulty of mango propagation true to kind, and we will be able to increase our good sorts and decrease the bad. This method of working the mango can be carried out during the month, either on young seedlings or older trees of inferior varieties that it is deemed desirable to work over into more profitable lands.

Budding of both citrus and deciduous trees can be continued during the month, and the nursery will require constant care to keep it free from weeds, to see that all ties are cut and all buds properly started and tied up; as, unless the young tree is properly started and trained to a single stem in the nursery, the grower has considerable difficulty in getting it to grow into a decent tree when it is permanently planted out in the orchard.

Strawberry planting should commence during the month. The land, which should be a rich loam of moderately heavy texture, if possible, should be well prepared by thorough working to a depth of at least 12 inches. If the land is virgin scrub, no manure will be necessary; but if it has been under crop for some time it should receive either a good dressing of well-rotted farm manure or of a commercial fertiliser rich in phosphoric acid, potash, and nitrogen, such as that recommended in this *Journal* in the articles on manuring which appeared under the heading of "Fruit Culture in Queensland" some months since.

Choose moist, showery weather for planting strawberries, and take care to set out nothing but strong, healthy runners. If the land is dry at time of planting it will require irrigating, and this is best done by opening up a furrow in which the plants are to be set, and filling it with water. As soon as the ground has soaked up the water, set the plants in the furrow and cover them with the dry soil. This method of watering will be found far better than setting the plants in dry ground and watering afterwards; as the moisture is all at the root of the plants, and the dry soil that is placed on the top acts as a mulch and prevents the soil from drying out. Where leaf blight is troublesome—viz., wherever the Marguerite is grown—all plants should have all old diseased leaves removed, and the crowns and young growth should be dipped in Bordeaux mixture, taking care that the Bordeaux mixture is made from the best bluestone and not from an inferior article, as the cheap bluestones contain more or less sulphate of iron, and this will destroy the bulk of the plants dipped into a solution of which it forms part.

The best strawberries to grow are—

1st, for early box berries—Aurie and Marguerite.

2nd, for mid-season box berries—Aurie, Marguerite, Federator, Pink's Prolific, and Trollope's Victoria.

3rd, for jam—Pink's Prolific, Trollope's Victoria, and Marguerite, though the latter has not the colour of the former.

These are in addition to those named, besides several seedlings that are showing considerable merit, but are not yet fully tested.

Openings for Queensland Cultural Industries.

Under this head I propose to briefly note from time to time inquiries which may come under my notice for products or articles capable of being produced in the gardens, fields, and forests of our State.

PHILIP MAC MAHON.

RHEA, OR CHINA GRASS.

Messrs. Thirkell and Co., 155 Fenchurch street, London, writing to J. R. Royle, Esq., C.I.E., Secretary and Curator, Indian Section, Imperial Institute, London, S.W., under date the 16th November, 1899, say :—

“Will you please make it known to whom it may concern that we are prepared to contract for all the Rhea Ribbons that can be grown in India for years to come, at about £15 per ton? A new use has been found for Rhea, for which very large quantities are required. We have orders to purchase all we can get at moderate prices. You may confidently recommend the Government to foster the cultivation as much as possible.

“We prefer the Rhea in the bark—that is, what the trade call ‘Rhea Ribbons,’ the crudest form in which Rhea can be shipped—thus obviating any large initial outlay for plant and machines. We can supply decorticators to pass about 10 cwt. per day at about £40 each. The Rhea can be decorticated on the field, and requires only to be thoroughly dried, and may be press-packed as tightly as jute.

“You may refer to us anyone wishing to grow or ship Rhea, and we will satisfy him of our ability to take all he can sell. May we ask you to pass this information on to other sections of the Institute, so that the growth of Rhea may be increased in all countries? We want, and shall want for some years to come, all the Rhea the world can produce, at moderate prices. We may add, the buying of Rhea for this new industry will be solely in the hands of the writer.”

It would evidently pay anyone contemplating embarking in this promising industry to communicate direct, or through the Department of Agriculture, with Messrs. Thirkell and Co., 155 Fenchurch street, London.

The above information comes from Dr. George Watt, Reporter on Economic Products to the Government of India.



HIS MAJESTY KING EDWARD VII. AND THE QUEEN CONSORT.

King Edward VII. was born at Buckingham Palace 9th November, 1841, and is consequently fifty-nine years of age; married on 10th March, 1863, to Princess Alexandra, eldest daughter of the King of Denmark, and sister to the Empress of Russia and the King of Greece; proclaimed King of Great Britain and Ireland and Emperor of India on the 23rd January, 1901.

Queen Victoria as an Agriculturist.

Not only has the British Empire to deplore the loss of the noblest and wisest Queen that ever sat on the British throne, of a true woman, of an exemplary wife, of an affectionate mother, of one who made the joys and sorrows of her people her own, but the world of arts, science, and literature has lost a generous patron in the person of Her late Majesty, Queen Victoria. And in like manner the agricultural world will deeply feel the removal of the august lady, who made rural pursuits one of her favourite occupations, not as a mere *dilletante*, but as an excellent and discriminating judge of whatever pertained to the garden and field, to stock-breeding and dairy farming. To all these pursuits, Her Majesty, by her example, extended the fullest encouragement; attending numerous agricultural shows, inspecting and keenly criticising the stock exhibits, freely exhibiting stock from her own herds, content to take her chances of a prize with her competitors, and never chagrined at her exhibit being placed second or third, provided that the winner had shown something superior to the royal exhibit. At the annual dinner (15th December, 1900) of the Aberdeen Angus Club, the chairman, Mr. W. S. Ferguson, said that the stockbreeders of the country were greatly indebted to the Queen and Royal Family for the interest which they took in stock, and they congratulated Her Majesty on her late victory at Birmingham.

As an instance of Her Majesty's discrimination as a judge of stock, the Queen was once present at Smithfield at a show when a fat Devon ox was being much admired. Hitherto, Her Majesty had not had much experience of this breed, but the little Ruby took her fancy. She carefully inspected it, and by and bye returned to examine it a second time. Then she remarked to one of the attendants, "I see why the Devons are so highly prized: they have more of the ninepenny than the sixpenny beef on them."

On the death of the Prince Consort, in 1862, the Queen took up the management of the Shaw farm, and it was carried on under her personal direction up to the time of her death. She was most fortunate in securing the services as manager of Mr. Tait, a Scotchman, and one of the acknowledged best judges of stock in the kingdom. On his death, he was succeeded by his son, the present manager. For years the Shaw farm has been a model breeding farm, the cattle, sheep, and pigs being among the best in Great Britain. Some of the Berkshire pigs from the Queen's styes were recently introduced into this colony by Messrs. Birt and Co., and are now located in their styes at Hemmant and in those of Messrs. Baynes Brothers at Belmont. But it was in shorthorns that Her Majesty's farm excelled. Her Majesty favoured the Scottish shorthorn rendered famous by the late Amos Cruikshank, of Sittyton, Aberdeen; and for years the principal prizes at the leading agricultural shows have gone to Her Majesty. A few years ago a stud shorthorn bull from the herd, named Birthday, was sold for 1,000 guineas. Next in importance to the "beef" shorthorns were the dairy shorthorns, and on many occasions Her Majesty's dairy shorthorns carried off premier honours at the National Dairy Association's shows, beating Ayrshires, Jerseys, Guernseys, and all other breeds, both in quantity of milk and quantity of butter per milking. Her Herefords, although not so conspicuous, have always had a good place in the fat-stock shows, and, of course, the Aberdeen-

Angus polls have a place in the herd, but principally for the purpose of producing crossbreds for beef purposes. The Shaw farm "blue-roads" have always shown up well at the block tests. At the time the Shaw farm was under the personal superintendence of the late Prince Consort, he established a new variety of pig which went under the name of the "Prince Albert breed." In the development of this new variety, the Chinese pig played an important part. But this new breed fed to too much fat, and was unsuitable for bacon factories. The improved Berkshire took their place on the farm, and the large Yorkshire and White Essex have also undergone great improvement there.

Of sheep, the South Down would appear to have been in greatest favour, the flesh of which has always been considered superior to any other English variety.

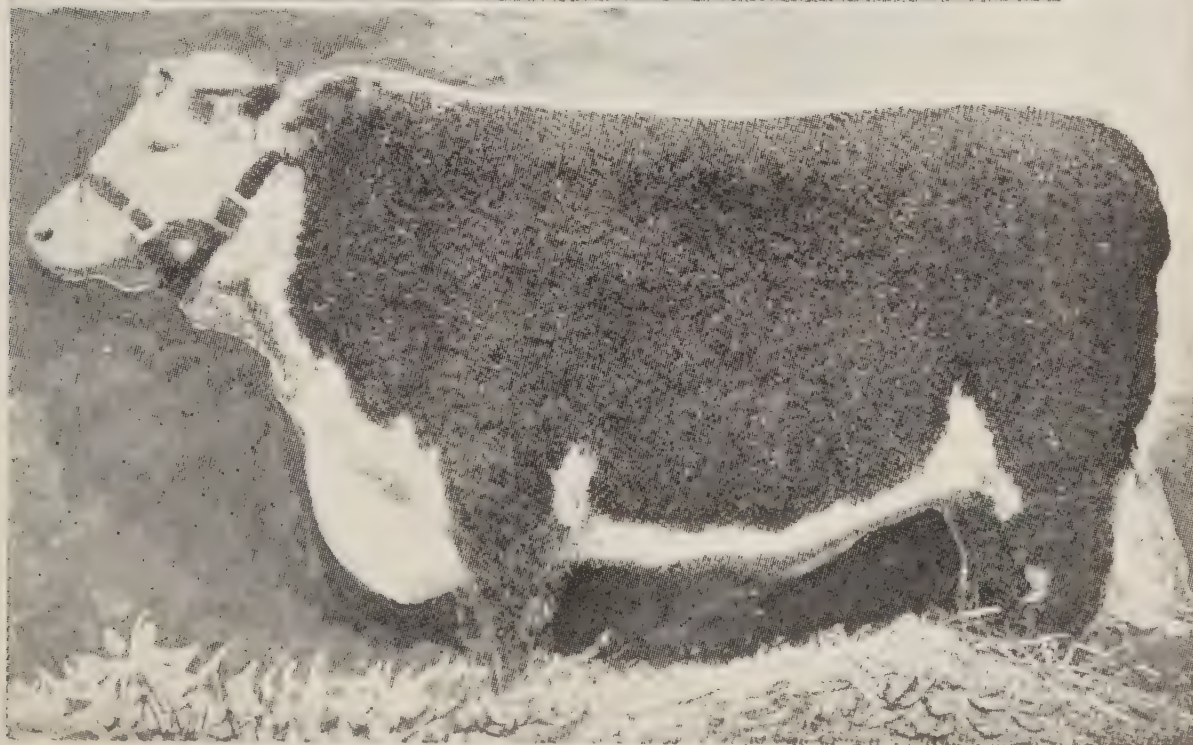
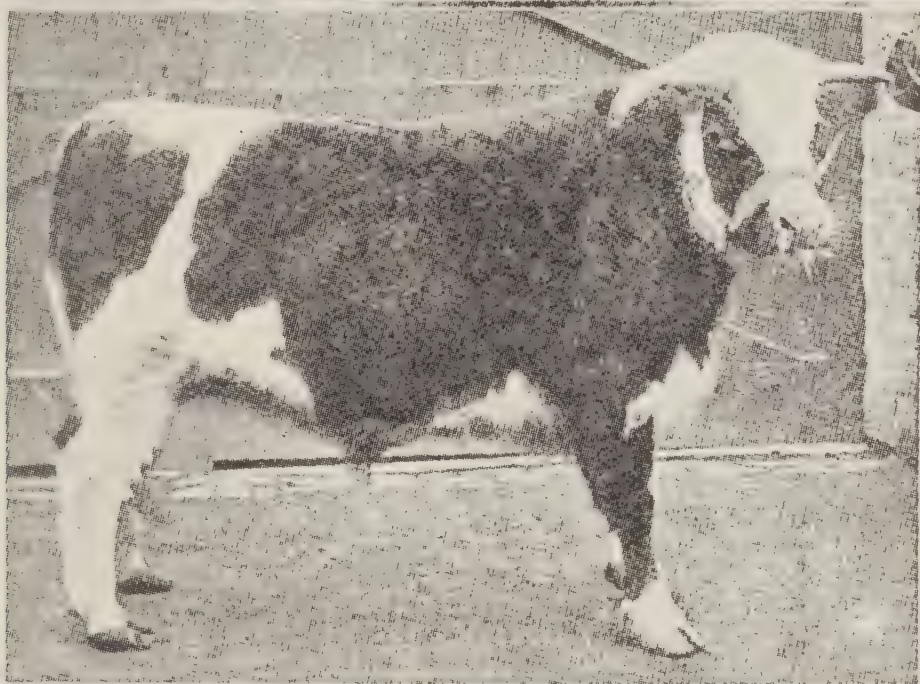
For years store stock were purchased for the farm for fattening, and many Smithfield and Birmingham prizes for these went to the farm; but latterly Her Majesty deemed it unwise to exhibit stock bred by others, and her manager was instructed that no fat stock other than those bred on the farm were to be publicly exhibited. Notwithstanding this, the herd has more than held its own.

Each year Her Majesty the Queen's fat stock sale has been looked upon as a very popular fixture in Smithfield week. Last year, however, it was considered necessary not only to change the date, but the place of sale as well, which, instead of being held at the Flemish farm, Windsor, on a Wednesday, took place on the last occasion at Messrs. Buckland and Son's saleyard at Slough. A combination of circumstances led to this plan being adopted. The chief of these was that Her Majesty's pedigree live stock have increased and flourished so exceedingly that all the buildings both at the Shaw and Flemish farms are crowded, so that there was not sufficient accommodation available for the annual sale. The change was not for the best, as south and west of England, as well as Welsh buyers, were absent, only Manchester and district as well as Sheffield being represented. In the cattle section there were sixteen blue-greys, well fed and of heavy weights. The sixteen blue-greys made £509, or an average of £31 16s. 3d. each; and the ten Devons realised £283, or an average of £28 6s. The seventy-five Highland sheep made £161 15s.; average, £2 0s. 5½d. Fifty Hampshire Downs, £177; average, £3 10s. 9½d. The grand total of the sale amounted to £1,130 15s.

At the carcass competition at the Smithfield Club's show last year, Her Majesty took first prize in two classes. Her Majesty's shorthorn heifer, Cicely, also took the Queen's Challenge Cup, value £150, for the best beast in the show bred by the exhibitor, and gold medal to the holder but not final winner of the cup. The Breed Cup for the best shorthorn also fell to Her Majesty; but the cup for the best Devon and Hereford fell to Mr. John Wortley, with the steers Baden-Powell and Lord Roberts, Her Majesty coming in second.

The Royal Counties Society has always enjoyed a large amount of patronage from the Queen and members of the Royal Family, and the last Winchester Show proved no exception to the rule.

It is pleasing to know that His Majesty King Edward VII. and the Queen Consort are as enthusiastic as Her late Majesty in the cause of stock-breeding, dairy, and general agriculture. His Majesty's farm at Sandringham is celebrated for the splendid stock bred there.



I. THE LATE QUEEN'S SHORTHORN HEIFER, "CICELY."





FOXTON, THE HON. JUSTIN FOX GREENLAW, M.L.A.

Born in Victoria, September 24th, 1849; arrived in Queensland, 1864; admitted as a solicitor in 1871; elected to Parliament as member for Carnarvon in 1883, which constituency he has continually represented. Mr. Foxton was gazetted Minister for Lands in 1896, and in 1898 he succeeded the late Hon. J. R. Dickson as Home Secretary, which position he still holds. The Hon. gentleman holds a commission as Lieut-Colonel commanding the Queensland Brigade Division of Field Artillery.

Agriculture.

FIELD AND GARDEN REMINDER FOR MARCH.

By HENRY A. TARDENT,
Manager, Biggenden Experiment Farm.

At the time of writing (12th February) this district and other parts of this State have not had yet the benefit of the rains usual at this season of the year.

Those rains might yet come and they might not, so that we should be prepared for farming in dry weather, and for meeting, without injury, an excess frost.

Deep working of the land is, so far, the best prevention I know of. It works both ways, and is within reach of nearly everyone.

It applies also to nearly every crop, except, perhaps, cereals. For these, in this case, opinion is yet divided, which is due no doubt to the great diversity of conditions.

If very rich land is worked deeply, the wheat has a tendency to grow rank, to be too sappy, and consequently more liable to rust. In poor or moderately rich land, deep ploughing gives good results, especially if done a few months in advance. Then give a second shallow ploughing or a good working by means of the cultivator, springtooth harrows, &c., just prior to sowing.

Should anyone doubt the necessity of a second ploughing for wheat, let him work a small patch in that way right across the middle of his field. I venture to prophesy that he will have no difficulty in finding the place again when the crop is full grown.

In this State, the wheat-grower has the advantage of a long sowing season; in fact, it extends from March to June, inclusive.

Very often the early-sown wheat, kept, if required, in check with flocks of sheep, gives the best results. At other seasons, especially in case of late spring frosts, the late-sown wheat is the surest cropper.

Everyone should, therefore, use his own judgment and consult his convenience according to his acreage, available draught animals, labour, seed, &c. As a rule, the good farmer seldom puts all his eggs into one basket.

On the Downs, Allora Spring, Budd's Early, some of the Marshall's (Nos. 3 and 8 especially), also Belatourka, are yet the favourites with the experienced growers. I anticipate the inclusion, ere long, in that list of some of the Farrar's collection.

Further west, in the Maranoa district, excellent results are being obtained from Ward's Prolific and Tardent's Blue. This last variety, introduced some twelve years ago into the State from the shores of the Black Sea, is also well spoken of in the southern colonies and in New Zealand, where it was sent by our Department of Agriculture. According to official records, it went in New Zealand up to 70 bushels to the acre. It also holds the grain well, so that Mr. Farrar uses it frequently as a stock to be inoculated with other varieties.

On newly broken land, especially if of chocolate colour and not too rich, barley does better than wheat. The erection, of late, of large malhouses has created in this State a demand for barley far in excess of the supply. The price is also, so far, much steadier than that offered for wheat, which is at present discouragingly low. These circumstances should induce many farmers to devote a certain part of their acreage to barley.

Chevalier is so far the favourite for malting purposes. Last season we tried here, with success, the Sea-of Azof barley, a variety with 6-rowed ears.

For excellent winter green feed, sow Cape barley; where the climate is not too moist, and there is not danger from rust, sow Nepaul or Skinless barley.

Its great advantage lies in the fact that it grows so quickly. In from ten to twelve weeks it is ready to cut. The seeds, which look like hard flinty wheat, form also an excellent food for poultry, hogs, and horses.

Wherever possible, sow also some rye and oats (Tartarian and Algerian). In rich land, they have a tendency to grow too rank, and should be sown rather thickly, whilst when cereals are grown for seed they should never be sown thickly. For wheat, from half to three-quarters of a bushel per acre is the utmost required; often less gives the best results, especially when drilled in.

If the weather is favourable, March is a good month to sow lucerne, for which the land should have been prepared in advance by subsoiling, ploughing, and thoroughly pulverising to at least 18 to 20 inches deep.

Do not sow too thickly. From 10 to 12 lb. per acre will be amply sufficient, and even less if you can use the drill. On forest land and on land inclined to be rather heavy, lucerne should always be drilled in—the drills to be from 12 to 18 inches apart. This allows the scarifier and harrow to be passed over the field after every cut. In that way lucerne, when rooted, stands dry weather well.

This is also a good time to sow, and especially to transplant *Paspalum dilatatum*. No dairyman in this State should fail to try at least a few roots—just to see how it would suit him—and from these he can, later on, multiply by dividing his roots and from seeds.

Where early frosts occur, it is getting rather late for potatoes. But in other parts they can be planted yet up to the middle of the month with a fair prospect of success.

This and the following month are the most suitable for the main crop of onions and other members of the same family, such as eschalots, garlics, leeks, potato onion, and tree onion (*Rocambole*).

For a small patch—and every farmer, nay every owner of a 16-perch allotment, should have one—it is a good plan to sow thinly in a box, and to transplant when the young plants are from 5 to 6 inches high.

But when onions are grown in large quantities for commercial purposes such a plan would require too much labour, more, in fact, than we can afford in this country.

For onions, first work the land thoroughly, thus: Give a first deep ploughing. Let it be exposed for some weeks to the beneficial influence of the atmospheric gases. Then harrow and cross-plough, roll and harrow, re-roll and re-harrow, until a layer of from 3 to 4 inches deep is as fine as flour. Then take a Planet Junr. hand hoe with the mouldboards turned inwards, and lay out the land in small ridged rows from 12 to 18 inches apart. Along the top of these ridges, sow the seeds with a Planet Junr. hand seed drill, so regulated as to drop from one to two seeds from 6 to 9 inches apart.

The Planet Junr. hoe has all the little tools which are required to grow and harvest the crop, such as little rakes, scarifying teeth, horizontal weed-cutting knives, &c. The only work to be done by hand is the thinning. When the crop is grown with the help of the two above implements or some others similarly arranged, the onion is, perhaps, the best poor man's crop we can grow in this State. It gives high returns per acre, and is suitable for an eminently interesting class of settlers—namely, those who are richer in children than in sovereigns.

We import annually onions to the value of £20,000, yet the market is seldom glutted, and usually remunerative prices rule throughout the year.

Be careful about the quality of the seed, which is often disappointing. Get your seeds from some reliable seedsman, and test them before using.

If the above directions are adhered to, 4 lb. will be sufficient to sow 1 acre. When sown by hand, it takes 8 lb. per acre; and from 20 lb. to 25 lb. when broadcasted. This last plan is a barbarous and wasteful one. It is to be deprecated, as it is entirely unsuitable to our climatic and other conditions.

The varieties mostly grown for market purposes are Brown Globe and Brown Spanish.

For pickling, sow thickly some of the Silver Skin variety.

Leeks are grown in a similar manner, except that they require, if possible, a deeper soil, and must be sown or transplanted not on ridges, but at the bottom of drills, so that later on the earth may be drawn towards them.

For both onions and leeks the land should be friable and rich. If not naturally rich, it must be made so with well-rotted manure, bonedust, phosphates, &c.

In the vegetable garden sow and transplant throughout the month all sorts of winter vegetables, such as cabbages, savoys, cauliflowers, brocoli, Brussels sprouts, Kohl-rabi, beet roots, and even chards, parsley, spinach, carrots, chicory, parsnips, Swedes, turnips, radishes, lettuce, endive, mustard and cress, peas, &c.

Sow also and transplant all sorts of culinary herbs, such as thyme, marjoram, sage, hyssop, &c.

If the weather is favourable, transplant also globe artichokes, both seedlings and suckers, rhubarb roots, asparagus, horse radish, &c.

THE AGRICULTURAL CO-OPERATIVE SOCIETIES OF FRANCE (*SYNDICATS AGRICOLES*).

By HENRY A. TARDENT.

Some time ago an International Congress of Agricultural Co-operative Societies was held in Paris. From data communicated to the congress it would appear that such societies have made tremendous progress in France. The movement is there only of recent origin. In 1884 there were in the whole of France only five *syndicats agricoles*. In 1889 there were already 557. Now there are 2,700, with a membership of upwards of 800,000. The movement has been more intense in the east and south-east. The most powerful is that of Sarthe, with 12,000 members. About twenty *syndicats* have over 3,000 members each. A pleasing feature is the formation of a great number of purely local (communal) and provincial (departmental) *syndicats*. Those have, of course, felt the necessity of federating together for mutual, moral, and in some instances material support. There is now a National Federal Union of the *syndicats agricoles*. It was formed in 1886 under the auspices of the National Agricultural Association. There are also several (ten) regional unions of *syndicats*, embracing societies from seventy-two departments or provinces. The South-eastern Union is the most powerful. It comprises 260 local *syndicats*. It is closely followed by the unions from Burgundy, Franche Comté, &c.

I translate the above facts from a Russian agricultural journal (the *Zemledielie*) with a view to attract to them the attention of the Queensland farmers. Were such local, regional, and national agricultural co-operative societies established here, the result would be an immediate and important cheapening of agricultural machinery and implements, of seeds and fertilisers, and an important increase in the price received by the farmer for his crop. These two gains being added to each other would amount to about 50 per cent. of the farmers' incomes—that is, a farmer who gets now £100 net from his farm would increase that income up to £150. The moral and intellectual gain would be larger still. The influence for good which such associations would exercise on their individual members and on the public life of the State would be incalculable. It is eminently a civilising and elevating movement, as it gives us the advantages derived from social co-operation as well as those attached to individual self-reliance. I strongly advise our agricultural societies and the Queensland Press to study this question under all its aspects—to think it out thoroughly, and make it one of the principal objects of the yearly agricultural conference. In that way we could appropriate to ourselves whatever is good in the systems in use in other countries, avoid their mistakes and failures, and elaborate a system of our own with every chance of ultimate success.

MACHINERY AND LABOUR-SAVING DEVICES IN THE UNITED STATES.

GRAIN ELEVATORS.

The methods employed for handling large quantities of material have been brought to great perfection in the United States.

Take, for example, the handling of grain. Over 300,000,000 bushels of flour and grain of all sorts were received and shipped in Chicago during 1899. To handle this enormous quantity economically is, of course, of the utmost importance. A few particulars as to how this is done may therefore be of interest. The information is supplied by one of the largest concerns in Chicago, and may consequently be taken as a fair sample of them all.

About 85 per cent. of the 300,000,000 bushels was carried by the different railroads, and the remainder arrived by water.

When the grain arrives from the outlying districts it is stored in large warehouses until it is convenient to ship it.

The trucks are run into the warehouses alongside the elevators. The trucks have an average capacity of about 900 bushels, and are discharged by a couple of men in from ten to fifteen minutes. To assist them in discharging they use two flat wooden scrapers which are operated by ropes and pulleys from transmission in the warehouse.

The grain falls at the foot of the elevators, and is run up to the top of the house in steel buckets fixed on belts made of rubber and canvas. Each elevator carries from 8,000 to 15,000 bushels an hour. The number of elevators in each warehouse is, of course, regulated by the quantity of grain to be handled.

About 18,000,000 bushels of grain annually pass through these particular warehouses, and they have a storage capacity of about 8,000,000 bushels.

The warehouses are divided up into bins holding from 6,500 to 30,000 bushels each, the more modern buildings being provided with larger bins than the older ones.

When it is necessary to transport the grain along the level—that is to say, from one part of the building to another, without the necessity of using the elevators—it is carried on wide belting made of rubber and canvas. The grain is run out of hoppers on to the belts and is carried along to whatever part of the house it is required. These belts are capable of carrying from 15,000 to 20,000 bushels an hour.

A large portion of the grain is passed through cleaners at the rate of from 800 to 1,000 bushels an hour.

To operate all these elevators, belt transporters, cleaners, and electric light machinery, there are three steam engines—one of 1,400 h.p. of a vertical marine type, and two of the Corliss type of 600 and 450 h.p. respectively.

Vessels are loaded at the rate of 350,000 bushels per day of ten hours; and about 160 railway cars, averaging about 900 bushels each, can be loaded in the same time.

The charge for storing grain in these warehouses is three-fourths of a cent, about one-third of a penny, per bushel for the first ten days. This price includes the cost of discharging, storing, and loading. For every subsequent ten days the sum of one-quarter of a cent, say half a farthing, per bushel is charged.—*Board of Trade Journal.*

PROPOSED CHAMBER OF AGRICULTURE.

At the annual meeting of the Rockhampton Agricultural Society, held on the 31st instant, the following resolution was passed after a most interesting and effective speech had been made in support of it by Mr. Will. McIlwraith:—
“That in the opinion of this society the time has arrived when the organisation

of arable agriculture by the formation of a Queensland Chamber of Agriculture, with branches in the different districts and localities of the colony, is desirable."

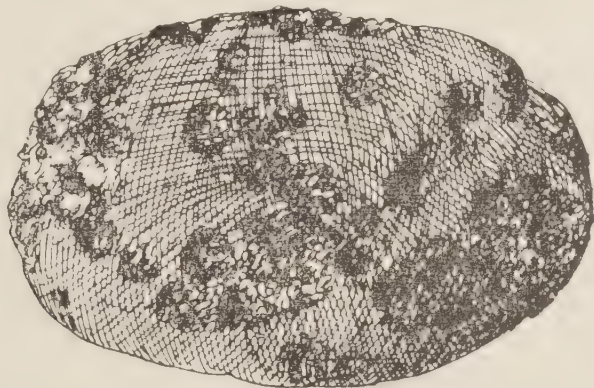
The secretary, in forwarding this resolution to societies interested, says:—"My committee request that you will bring the resolution and the matter which accompanies it before your members; and they will be glad if you will, at the same time, invite them, if they approve of the motion, to address the Minister for Agriculture in support of its aims, and instruct their delegates to the next Agricultural Conference to bring the question before the Conference with a view to its being discussed and approved by the delegates in attendance."

The extended report of the proceedings shows that it was decided that copies of the resolution be sent to the Government Agricultural Department for transmission to the next Agricultural Conference, and that copies of the resolution and newspaper reports be sent to all the agricultural societies in Queensland.

POTATO SCAB.

Mr. Claude Fuller, Government Entomologist, Natal, writes as follows, concerning this disease, in the *Agricultural Journal* of that colony:—

Potato scab is not a particularly prevalent disease; still most farmers are more or less acquainted with it, so that the accompanying illustration, though a poor one, may perhaps convey some idea of the appearance of a potato attacked by it.



POTATO SUFFERING FROM SCAB.

The chief characteristic that will be noticed is the peculiar roughness or scurviness of the skin, which has the appearance of a scab, and beneath this decay or injury to the tuber is often found to some depth. In some varieties, however, the disease is quite superficial and simply disfigures but does not destroy. Potato scab is attributed to a fungus known as *Oospora scabies*, and it occurs in many parts of the world—nearly everywhere, in fact, that potatoes are grown. As is the case with the gall-worm disease, it is introduced to the farm with seed potatoes, and it is generally believed that diseased seed will communicate the disease to sound tubers. There is also little doubt that soil which has carried a scabby crop will infect future potato crops planted in it. Certain manures are regarded as favourable to the increase of the disease; these are kraal manure, lime, and ashes. This is American experience, it is true, but many of our farmers have come to the same conclusion in certain localities.

The treatment for this disease is simple. In the first place, it is necessary to avoid planting in infected lands, and in the second it is necessary to treat diseased seed. This has been successfully accomplished by soaking the seed for one and a-half hours in a solution of corrosive sublimate, using 1 oz. of

the sublimate to 9 gallons of water. A number of experiments have also been carried out with a weak dilution of formalin. The best results appear to have been obtained by using 8 fluid oz. of commercial formaldehyde mixed with 15 gallons of water. One authority has given sulphur as a remedy ; using it at the rate of 300 lb. to the acre, sprinkling it in the open row.

BENEFITS OF POTATO-SPRAYING.

The *Farmers' Gazette* has lately published the results of a potato-spraying experiment carried out in Ireland by Mr. W. Barnes, Westland, County Meath. Several acres were carefully sprayed with the ordinary sulphate of copper and lime solution. The potatoes were dressed twice at the beginning and at the end of the month of July. Another portion of the field was treated in exactly the same manner with respect to planting and cultivation, but the plants were not sprayed.

The report on the result states :—

“On that portion of the crop which had been twice sprayed the foliage was so dense and green that it was almost impossible to distinguish one drill from another, while on the immediately adjoining unsprayed plots all that was to be seen was a forest of bare stalks, all of them absolutely leafless, and many quite withered out of existence. A more pronounced contrast it would be difficult to conceive. At a little distance one portion of the field presented the appearance of a vigorous crop of potatoes at mid-summer, while the other showed hardly a trace of vegetation, because even the few stalks that remained had been withered into masses of bleached woody fibre. Here and there a few spots of disease could be discerned on some of the sprayed plants, but the extent of leaf surface so affected was so small as not to be recognisable at any distance.”

With regard to the respective yields of tubers on the sprayed and unsprayed portions, the following were the returns :—

Sprayed Section.

Large (marketable) tubers...	...	...	...	15-6 tons.
Small	“	...	...	3-9 „
Diseased (a trace)	...	...	2 tubers in a perch.	

Unsprayed Section.

Large (marketable) tubers...	...	...	...	6-3 tons.
Small	“	...	...	5-9 „
Diseased	“	...	...	2-4 „

Another instance of the benefit of spraying comes to us from Fifeshire, Scotland, on which the *Scottish Farmer* says :—At six stations various plots of potatoes were planted, and the same manures were used for all, consisting of 15 tons per acre of farmyard manure, applied in the drills, and the following artificials, applied partly in the drills and partly at the hilling-up period : 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 1 cwt. sulphate of potash. The average yields of the several varieties, sprayed and unsprayed respectively, were as below :—

Variety.	Early.			Unsprayed.					Sprayed.			
				T.	c.	q.	lb.		T.	c.	q.	lb.
British Queen...	...	...	...	12	0	2	23	...	11	19	3	18
General Kitcheners	...	...	...	11	18	0	7	...	11	1	2	25
Sutton's Abundance	...	...	...	8	18	0	20	...	8	15	0	24
Challenge	...	...	...	7	12	0	23	...	7	19	3	24
Late.												
British Lion	...	...	...	10	15	2	24	...	11	6	0	21
Up-to-Date	...	...	...	10	2	1	21	...	10	13	1	19
Scottish Triumph	...	...	...	9	18	0	2	...	10	13	1	14
General Roberts	...	...	...	8	10	0	13	...	9	1	1	20
Langworthy	...	...	...	7	18	3	3	...	8	5	1	11
Maincrop	...	...	...	6	16	3	10	...	7	8	0	20

The conclusions derived from the trial are as follow :—

The results of spraying in yields of sound tubers dressed over a riddle of 1½-inch mesh are given as averages of ten varieties and ten acres at the several stations :—

Centre.	Unsprayed.				Sprayed.				Increase.				Decrease.			
	T.	c.	q.	lb.	T.	c.	q.	lb.	T.	c.	q.	lb.	T.	c.	q.	lb.
Uthrogie	...	57	17	0	6	...	65	7	3	12	...	7	10	3	6	...
Balcomie	...	91	3	0	4	...	97	19	0	12	...	6	16	0	4	...
Cairnie	...	74	10	0	0	...	78	4	2	16	...	3	14	2	16	...
Montrave	...	50	13	1	16	...	58	13	1	16	...	8	0	0	0	...
Balbeggie	...	64	13	3	20	...	61	13	0	4	...	...	...	...	...	...
Lecker'tone	...	64	15	2	24	...	60	1	3	20	...	...	...	3	0	3
													...	4	1	3

Hence it is concluded that spraying is beneficial if carried out early enough in the season. Late spraying retards the growth, and does little or no good. On the other hand, it appears that, if spraying is carried out at the proper time and under suitable conditions of weather, the bulk of the crop is increased, while there is less disease and a larger proportion of marketable potatoes.

LUCERNE.

Many farmers will be sowing lucerne next month ; hence it will not be out of place to give some directions to new beginners as to the best method of sowing this crop.

In the first place, lucerne should never be sown in a shallow soil with a stiff, retentive clay sub-soil. What the plant likes is a rich, friable loam of great depth, through which the roots can penetrate to reach the natural moisture below.

On the very rich scrub soils and on the deep black soils and light loams, such as are found between the coast and the Main Range, and above the range on the Darling Downs, lucerne is no more difficult to grow than oats or any other cereal or legume. On such lands there is abundant plant food, such as lucerne loveth ; and the great depth of soil, reaching, in some instances, notably in riverine scrubs, to 20 and 30 feet, enables its roots to penetrate to the same distance in search of moisture.

But when there is a subsoil of such a nature that it is slightly retentive, and which can be easily worked, some trouble must be taken to bring it into good tilth and to loosen the subsoil to a considerable depth. In this case, a furrow should be turned in the usual way by one plough, and a second plough—without the mould-board—breaks up the subsoil to a depth of some 12 inches, but does not turn it over. Then the land is reduced to as fine a tilth as possible with the usual implements adopted to the purpose. It is absolutely essential that the land be reduced in this way, for the small lucerne seeds (of which there are 12,600 in a single ounce) would fail to germinate if buried amongst big clods.

The land having been prepared and thoroughly cleaned, the next thing to be considered is whether to sow broadcast or in drills. Each method has its adherents, but experience has shown that it is far more troublesome to keep the young plants clean when sown broadcast than when sown in drills. However clean the land may be when sown, weeds of some kind are bound to make their appearance before the young plants are strong enough to get away from them. Cases have occurred on the Brisbane River where whole families have spent days on a five-acre field picking by hand the weeds which the harrows failed to destroy. When sown in drills, on the other hand, it is comparatively a simple matter to keep the spaces between the drills clean by a machine hoe.

The hoe should be set to work when the plants are 2 or 3 inches high. Some harrow the broadcast-sown field, but this is objectionable, as the harrows do a considerable amount of damage to the young plants without effecting a perfect clearance of the weeds. Should these again make their appearance, the machine hoe will clear them off finally if set to work when the plants are from 6 to 8 inches high.

As to the quality of seed to sow, the best authorities disagree, and naturally so, as many things have to be taken into consideration which must affect the question. These are—kind and condition of soil and subsoil, aspect and climates. However, taking the results of many experiments conducted by practical men, it would appear that 10 lb. of seed are ample when sown broadcast, and from 5 to 6 lb. when sown with the machine drill. The drills should be about 12 inches apart, and should only be covered to a depth of one-eighth to one-quarter of an inch. The best results have been obtained at this depth. As the plant is very tender for the first six months, it is a good plan to mow the field, so as to destroy all weeds growing amongst the rows before they seed. Once the taproot has got hold of the soil, the plant will have gained sufficient strength to make head against any weeds that may afterwards appear. Lucerne thus treated will stand for ten years, and can be cut six or eight times a year.

Sometimes the land becomes what is known as *lucerne sick*, owing to the long continuance of the crop on the ground. It will then require two years' rest. Either fallow a season and the following year take a crop of potatoes or corn, after which lucerne may be sown again, or green fallow the land for two years, taking one crop of some cereal each year.

One of the greatest enemies of lucerne is *dodder* (*Cuscuta australis*). It was introduced some thirty years ago with seed from New South Wales. It is a kind of vine which creeps up the lucerne stems, twines round them, and, by means of small suckers or rootlets, feeds on the sap of the plant. If allowed to grow, the field rapidly assumes the appearance of patches of ring-worm. The main root of the dodder dies, but its tendrils spread in a circular form, leaving the lucerne in great yellow circles. It should be at once dug out, lucerne and all, and carefully carted away or burnt. The least little bit of it will grow, so great care is necessary in removing it. The patches should be sprayed with sulphate of iron. Make a solution of as much of the sulphate as a cask of water will take up. Cut the diseased patches, burn the lucerne and water the spot with the liquid. It thoroughly kills the dodder, and gives greatly increased vigour to the lucerne. A good dressing for lucerne, says Mr. J. L. Thompson, Instructor in Agriculture, New South Wales, consists of 2 cwt. superphosphate, 1 cwt. kainit, the former supplying the phosphoric acid and lime, the latter the potash. A top dressing of gypsum generally proves highly beneficial.

The cost of preparing the land, of seed, and sowing will reach about 25s. per acre; and no further expense is entailed, once the field is established, for several years, except perhaps an occasional dressing of manure.

ON SUBSOIL TILE-DRAINING TO RETAIN WATER.

By W. PETTIGREW.

Persons from Great Britain, acquainted with tile-draining the ground to remove superfluous water, require no remarks from me as to the advantages of the same. The Honourable Angus Gibson, M.L.C., of Bingera, Bundaberg, has lately published a letter in the *Courier*, showing the great advantages of such work for agricultural purposes in Queensland; first at Doughboy Creek, and lately at his sugar plantation, Burnett River.

But to tile-drain ground on purpose to make it hold more water, so as to be able to resist a continuance of dry weather, appears a contradiction or anomaly. Still it is a fact, and hence the object of this letter.

Assuming that the ground to be operated on has a fairly good soil of about 10 inches deep, and that below this, is a clay several feet thick, and that tile-

drains have been put into such ground at distances of $16\frac{1}{2}$ feet apart, and at a depth of 4 feet, then what takes place after these drains are in, is somewhat as follows:—

In dry weather the soil and subsoil shrink and crack, commencing at the surface over the drains, and gradually extending to the whole soil and subsoil between the drains and down to near the level of the tiles. These cracks extend in two directions in the ground at right angles to the drains, and somewhat parallel thereto. If rain comes, the cracks become more or less filled up with loose soil and vegetable matter, and the roots of plants follow down them in search of food and moisture. These roots die, but there they remain providing food and moisture for subsequent plants, and so on plant after plant lives, dies, and their remains enrich the soil and subsoil.

Suppose such ground has been so acted on for two years, and that a continuance of dry weather sets in; then there is a thunder-storm, and a fall of, say, $1\frac{1}{2}$ inches of rain in half-an-hour. Observe how undrained, cultivated ground is affected by the rainfall. The heavy rain in falling, levels the loose soil, and if the ground has a little slope, a great portion runs off. If level, it gradually sinks in, the air in the soil preventing the water getting easily down; whereas in the drained ground, the water sinks rapidly, carrying the air before it, and driving it into the drains. This rapid sinking of the water is very beneficial, as it takes it away from the surface where it would be rapidly evaporated by subsequent south-westerly winds. (This applies to Brisbane. The case may be different in other places.) Compare these soils after two days of drying winds. Both look as if rain had not fallen on them for a month. Turn up the soil of the undrained one, and the moisture is only down some 5 inches or less, whereas in the drained one the moisture is down about 8 inches. Both are dry for about $1\frac{1}{2}$ inches down.

The foregoing was written after reasoning from what I have seen, but the following paragraph is from measurements:—

Tuesday, 15th January.—Last night there was a fall of rain here about six-tenths of an inch, or 6 points; and to-day, about 10 o'clock a.m., I made measurements as to how far the moisture had gone down. On ground newly dug, of a rather clayey nature, the distance was from 1 inch to $1\frac{1}{2}$ inches. On somewhat hard undrained land, the depth was from 1 to 2 inches; on well-cultivated undrained ground, $2\frac{1}{2}$ inches; and on well-cultivated drained ground, about 3 inches.

Plants require moisture as their food, for all their food has to be taken up by the roots in a liquid state, except what is taken from the air by the leaves. Again, plants require air for their roots; hence the necessity of having drainage on stiff clayey soils to take air as well as water down to these roots. As proof of this, note the large timber growing alongside the railway at the Blackall Range, where there is porous subsoil and plenty of rain, and compare it with the poor timber growing along the flat country north of Caboolture River, where there is plenty of moisture usually, but no underground drainage. Again, there are the mangroves, whose roots grow in air-tight mud. These have aerial roots growing up from their true roots about a quarter of an inch in diameter and about 6 to 12 inches long. Plenty of these are to be seen about the mouths of our rivers in Moreton Bay.

One more case of want of air for roots of plants may be mentioned. Close on sixty years ago, when on a visit to a farmer near Maybole, Ayrshire, Scotland, he showed me a field he intended draining. In it were ridges of gravel, formed, no doubt, by a river at some previous period of the world's history. These ridges he said he did *not* intend to drain, as they were dry enough already. About two years afterwards, on a subsequent visit, I found that the ground had been drained nearly in the manner stated above; only several of the drains were carried through the gravel ridges. The field had a crop of turnips and looked well, except where the drains had not been carried through the dry ridges. On asking for a reason why it was so, the farmer said he could not tell; but he would drain them, although dry. My interpretation of the facts was the want of air to the roots of the plants on the undrained portion.

Authorities on draining ground state "that the soil abstracts moisture from the air, and that the power to abstract moisture from the air is much connected with fertility." "That the more the soil is divided, the greater is its *absorbing* power." These statements may be true, but, practically speaking, they are not worth much consideration in Queensland. I agree with the last sentence with one word altered: thus—"That the more the soil is divided, the greater is its *retaining* power." Further, the richer a soil is, by so much is its retaining power increased.

In order to test the speed of water penetrating various sorts of drained ground, and the quantities of water they are capable of holding, I made the following trials. I got a cylindrical vessel 6 inches in diameter, and 4·2 inches deep. This was filled with the different sorts of soils, which were well pressed in by hand and levelled off. There were holes in the bottom to let the air out. Each lot of soil was dry—

- 1st. Filling. Sand with a little vegetable matter. Water went through in 9 minutes. Proportion held being 1 of water to 3·85 of sand by weight.
- 2nd. Garden soil. Water went through in about 30 minutes.
- 3rd. Fine garden soil. Water went through in about 56 minutes, the proportion of water held being 1 to 3·12 of soil by weight.
- 4th. This consisted of broken-up, dry mud. It took a long time to absorb the water; indeed, it was left all night, and the quantity of water it absorbed was 1 to 2·33 of dry mud.

By the above it will be seen that sand saturated has about one-fifth of its weight of water, and that good garden soil has about one-fourth; that water sank most quickly into sand, being at the rate of about 1 foot in 30 minutes; that in one garden soil the water went through in 30 minutes; while in another rather finer soil, with possibly more clay in it, 56 minutes were required—that is, it took nearly double the time for water to go through the 4·2 inches.

From the foregoing statements a few inferences may be drawn respecting the economical cultivation of drained ground in dry weather with a very limited supply of water.

The surface of the ground and the underlying soil to a depth of 2½ or 3 inches must not be watered, as the water evaporates too quickly from that. Then, how to water the soil below that? This can be done, and has been done by placing metal pipes in the ground with several holes bored into the lower sides, placed with their tops over 9 inches below the surface, and laid about 8 feet apart. That is quoting from what has been found suitable. If drains have to be put in, which in Queensland will nearly always be the case, then it would be best to put these in at 16 feet apart, and the metal pipes at equal distances from the drains—thus, 4 feet, 8 feet, and 4 feet. Before putting the metal pipes in, the soil should be trenched to a depth of 18 inches, and given a supply of broken bones, which will be there as food for future plants.

A tank connected with a main pipe and stop cocks to each metal pipe should be arranged, so that a definite supply of water may be given to each piece of ground.

Then, how often should the ground be watered? The nature of the soil and subsoil, as also the nature of the crops, would determine that. Authorities on irrigation state that from ten to thirty days, according to the nature of the crops, would do. My opinion, acting on the principle of economy of water and also of aerating the roots of the growing crop, would be to water not oftener than once in ten days, and after that judge by experience. Then, what quantity of water should be put on at a time? The only authority for an opinion on this point lies in the trials above referred to, and numbered 2 and 3. The quantity of water absorbed was about the same in both instances—namely, about 1 of water to 3·12 of soil. This would represent a rainfall of 1·3 inches to saturate 4·2 inches deep. Double these would certainly be a fair supply at a time, or between 2 or 3 inches would do until experience was gained. In putting in the water, attention would be required not to let it rise to within 3 inches of the surface, so as to be lost by evaporation.

ACTION OF ARTIFICIAL MANURE ON WOOL.

FROM "*Der Tropenpflanzer*," TRANSLATED BY THE EDITOR.

The *Deutsch-australische Post*, writing on this subject, which is most interesting also in connection with South-west Africa, says:—The farmers have long since recognised the beneficial influence of artificial manure on their soils, and obtain better results since they have assisted Nature. It will not, however, have occurred to many people that, in order to obtain the best results in wool production, something similar would have to be done. It is well known that a large percentage of potash is contained in the moisture of the wool which is annually withdrawn from the soil and exported with the wool, so that in the natural course one of the most fertilising elements disappears.

A few figures will better illustrate this. In 1899, 231,451,779 lb. of wool were exported: this was a less quantity than in an ordinary season; from 1893 to 1899 the total export reached 2,111,863,834 lb. The nitrogen contained in this wool amounted to 380,135,484 lb.—that is to say, to as much as is contained in 1,697,000 tons of dried blood; the potash exported (in like manner) reached 12,672,000 lb., or as much as is contained in 45,265,000 tons of kainit—this is an unrefined potash salt which contains about 25 per cent. of sulphate of lime. Furthermore, in 1899, 4,600,000 sheep were slaughtered, and during the seven years from 1893 to 1899 a total of 46,088,677 were killed; the number of lambs killed during the respective periods was 192,000 and 1,009,187 respectively. The nitrogen withdrawn in this manner from the soil amounted to 70,634,514 lb., which is equal to 252,363 tons of dried blood. The phosphate of lime contained in these sheep and lambs totalled 70,634,514 lb., equal to 70,073 tons of bone-meal. From these figures it will be seen how important fertilising matter is drawn from the soil every year. Will this not influence in the long run the good properties of the wool? Is it not necessary to enrich the soil by artificial means, and thus to considerably increase the profit on the wool? These are important questions, and deserve to be carefully considered. That the potash goes off with the grease of the wool has been absolutely proved by the fell-mongeries; in one establishment in Liverpool 50 tons were recovered.

The grease of the wool consists principally of various soluble salts which have been extracted from the soil, and which, after they have circulated through the blood, have become incorporated with various animal acids. By the action of perspiration in the skin it is separated, and is retained clinging to the fibres of the wool, or forms a layer near the roots.

Another authority writes:—

Grease is found principally on the breast and shoulders; therefore, precisely in those places where the best and soundest wool is obtained in the greatest quantity, and in the same ratio in which the grease extends in a considerable degree towards other portions, is the quality of the wool. If, on the other hand, there is a want of grease, then the fibre of the wool is dry, hard, and weak, and the whole fleece becomes thin and hairy, whilst where the grease is plentiful the wool is soft and oily, rich and strong.

From this it follows that, whilst the grease improves the wool, potash promotes the production of grease, and furthermore, when breeders observe a want of grease in their sheep, this want can be rectified by judicious manuring of their land. Whether this theory can be worked out practically must naturally be left for proof to practical experiments, but the solution of the problem deserves full consideration by sheep-breeders.

A further question arises, and that is—"If the natural condition of the land demands 10 acres for one sheep, would it not be possible so to increase the fertility of the soil that these 10 acres could carry ten sheep."

Should this be the case, then the question of manuring is well worth considering, and all the more so, because the laws are most favourable to the smaller land selections. The more valuable the land, the more gratifying results may be looked for; still, the difficulty in answering these questions lies in the fact that as yet no experiments have been made:

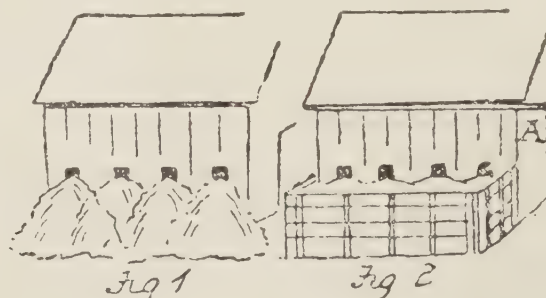
The *Farmers' Guide*, issued by the Australian Manure Company, Sydney, says:—The depasturing of cows exhausts the phosphatic salts and potash of the soil very quickly, and it is very important that these constituents should be returned to it, if it is desired to keep the meadows in a good condition.

One gentleman made interesting experiments in connection with cattle. He divided a large paddock into two parts, manured one half, and left the other as it was. Then he let the cattle in. The animals stuck to the manured side and grazed there until almost no grass was left; even then they preferred to nibble at the remains, although on the other side there was considerably more feed. As far as sheep and wool are concerned, the question of the value of artificial manuring remains an open one, and we trust that some of our leading breeders will be induced to make experiments and to publish the results.

FARMYARD MANURE.

A good average sample of farmyard manure contains 10 lb. nitrogen, 5 lb. phosphoric acid, and 10 lb. potash per ton. There are also in it all the other constituents requisite to produce crops on the land, such as lime, magnesia, chlorine, soda, oxide of iron, and carbonic acid. The constituents will vary in quantity according to the kind of food consumed by the farm stock. But, as most farm crops require double as much of potash as of nitrogen and more phosphoric acid than potash, these must be supplied by artificial manures such as muriate of potash and superphosphates. By the ordinary way of treating farmyard manure half the nitrogen is lost, and the liquid portion, which is the most valuable, is allowed to run to waste. If proper precautions were taken to prevent loss by leaching, and by evaporation, and by the manure heap drying out, less artificials would be required to supplement it, and the farmers would find themselves very much in pocket by a little original outlay on a proper receptacle for their manure.

Herewith we give a sketch of



A CHEAP MANURE PEN,

taken from the *American Agriculturist*:—

When there is no barn cellar, the most convenient place for piling manure that is removed from the stables daily is against the outside of the barn, under the eaves. The one operation of shovelling it out of a window finishes the job. As ordinarily practised, the water from the roof drenches and washes out the soluble parts of the manure (Fig. 1), while the edges and outside of the pile are dried by the sun and wind, so that most of the fertility is lost. But these conditions are very easily remedied. To do this, run a gutter or trough under the eaves to

carry the roof-water to one end of the barn (as at a, Fig. 2), where it falls beyond the manure. If the water settles back and soaks into the manure, dig a little trench to carry it away.

Build a silo or pen for the manure, as shown in the illustration. Make it 7 feet or 8 feet wide, and about 4 feet longer at each end than the windows from which the manure is thrown. If stock occupy the full length of the barn, the pen will be as long as the barn. The earth should be dug out about 2 feet deep inside the pen. The deeper the pile, the better it is; but the bottom cannot be much more than 2 feet below ground because of the difficulty of loading manure on the wagon. Make the sides of the pen of boards or small poles, and strengthen by using plenty of upright posts. The better plan is to put the side boards inside the posts, as the manure settles more compactly.

After the pen is built, cover the surface with 1 foot or 2 feet of muck, loam, or sods, and turn in one or two hogs to tramp it down. The important thing is to keep the manure spread evenly over the surface. The pigs may do this, but if not it will be necessary once or twice a week to spread the manure that piles under the windows.

The pen should be filled as full as possible before carting it out, but it cannot be filled above the window-sill without a good deal of work. When full, there is a solid block of manure about 5 feet or 6 feet deep, 7 feet or 8 feet wide, and as long as the pen. The little rain that has fallen upon it has hardly more than wet it down in good shape, but when very heavy rains fall add enough litter or loam to absorb the water. Never let the water run off the top of the pile, but add sufficient absorbents to keep the pile reasonably dry. In fact, absorbents must be added from time to time to take up the natural moisture if it is largely cow manure. When thus treated, there is practically no loss from rains, and the sun and wind have not practically hurt it, because of the small surface exposed. The entire pile becomes good, solid manure, and the loam that was originally placed at the bottom is just as good as the rest.

MANURING COW PEAS.

A cow-pea crop of 15,000 lb. of green vines per acre will contain 100 lb. nitrogen, 67 lb. potash, and 22 lb. phosphoric acid; therefore, three times as much potash as phosphoric acid will be required. The cow pea draws the nitrogen from the air; therefore, phosphoric acid and potash only need be supplied directly.

Mr. Bryan Tyson, of Hallison, N.C., writing to an American journal on the subject, says:—

In nearly all the formulas of fertilisers, for the various crops, the percentages of potash and phosphoric acid are usually about in the proportion of 4 parts of potash to 3 parts of phosphoric acid. A fertiliser composed of the following ingredients may be used for peas: Available phosphoric acid, 7 per cent.; and potash, 9 per cent. Apply 550 lb. per acre, and mix well with the soil, preferably two or three weeks before planting. One-half of the fertiliser may be applied in the drill, the residue broadcasted.

Instead of the above, the following materials may be compounded and used: Acid phosphate, 250 lb.; kainit, 300 lb. In lieu of kainit, 70 lb. of muriate of potash may be used.

The above will give large and satisfactory returns, but the quantity stated can be profitably increased from 50 to 100 per cent. Potash and phosphoric acid are drawn from the soil, and consequently it will be necessary to properly supply these materials from time to time.

More than this, by growing and turning crops of the legume family, such as clover, peas, &c., all the nitrogen that may be needed for the present and next crop will be virtually grown (drawn from the atmosphere). There will be a considerable surplus left over the requirements of the said crops, which will serve for the permanent enrichment of the soil.

The humus produced by the decaying vegetable matter will exert a further and beneficial influence on the soil, the details of which are not necessary here.

I will state here that the most convenient material for supplying nitrogen direct is nitrate of soda—Chili saltpetre. Therefore, if you would enrich your soil economically, grow all the saltpetre possible, which can be done as afore-said.

When commercial fertilisers are applied in the usual way, there is but little or no humus produced, and consequently the soil will continue to grow poorer, however abundant the application may be.

THE POTATO.

During this month the main potato crop should be in the ground. In the coast districts all planting should be completed by the third week in March. In order to obtain the best results, great care should be observed in the selection of seed. Whole seed is preferable for the present planting, but where such cannot be obtained the potatoes must be cut into sets, and we propose to show how enormous crops may be obtained by judicious cutting of the seed.

From notes supplied by Mr. James Pink, Wellington Point, we print the following remarkable results in potato cultivation. Mr. Pink says:—

I should like to offer a few remarks on the so-called degeneracy of the potato. When a new and improved seedling potato is first brought into general cultivation, it usually possesses a vigorous constitution and large productive powers. For the first year or two special care is devoted to its culture, and to the tubers after they are lifted. We speak in glowing terms of this new variety; we admire the beauty of its foliage, the symmetrical form and fine texture and flavour of its tubers, and, above all, its extra cropping qualities.

But in a few years, in all probability, it has fallen to the level of an average variety, and we say that the potato has degenerated. That it does degenerate, there is no doubt; but is there any one subject, either in the animal or vegetable world, but would have degenerated, or, more probably, ceased to exist, under such treatment as the potato has received at our hands?

It has been the practice to select for propagation the refuse of the potato heap; small, miniature, ugly, ill-shaped tubers have been considered good enough for seed; and when the result has not met our expectations, we have raised the cry that the potato is degenerating. In carrying out this practice for years, was it possible to arrive at any other result? It is one of Nature's universal laws that, when man neglects or abuses her, she falls back to her normal condition. But the very art of gardening is to lift Nature above her normal state, by good culture, by raising new and improved varieties of seed, and by selection.

The method of selection is peculiarly adapted to the principle of growing from single eyes. If we take an average good-shaped potato, weighing from 6 to 10 oz., we shall find that it has from twelve to eighteen eyes, which, if cut into single eyes, would give as many sets, which would naturally produce a more even sample of young tubers than the same number of whole sets of odds and ends that have been considered neither large enough nor good enough for cooking.

The principle of growing from single eyes has two great advantages—namely, economy of seed, and, upon suitable, well-tilled land, a larger crop of marketable potatoes. When whole tubers are planted, two or three eyes start into growth first; these keep the lead during the entire growing season, and

from their stolons the largest potatoes are produced. The weaker eyes start later into growth, and produce only small tubers of little value; but when single eyes are planted the whole strength of the set is devoted to one growth, all the young tubers are formed nearly at the same time, and the plant having no other calls on it for nutriment, these continue to grow and form large tubers. The whole tuber produces the largest number of potatoes, but the single eye will produce the most uniform sample and the heaviest crop per acre.

A series of experiments was carried out in the gardens of the Horticultural Society (London) under the direction of the late Professor Lindley, with a view to ascertain the relative productiveness of tubers and sets. A piece of ground was divided into 4-foot squares, and in the centre of each square was planted either a whole tuber or a single eye, or a set containing three eyes on the whole surface of the tuber pared off so as to leave the eyes safe, but removing the centre—a practice not uncommon in Scotland.

If we consider the results of the whole sixteen experiments as being but one experiment, we shall find their proportions expressed by the following figures:—

Whole tuber	...	...	...	338.38	or	2	} nearly.
Single eyes	...	...	...	717.87	„	11	
Three eyes	...	...	...	613.94	„	5	
Parings	...	...	...	504.69	„	4	

In adopting the principle of the single-eye culture, it is requisite that the eyes should be taken from large or average size potatoes, for the smaller the potato the weaker are its producing powers. The crown eye always grows the strongest, and produces the largest potatoes, often approaching to coarseness, while those taken from the middle or body of the potato produce the best-shaped and most uniform tubers.

There are several ways of cutting a potato into single eyes: the principal thing to aim at is to obtain a fair share of the flesh of the tuber to each eye with the least amount of cut surface. The following is the American method, which is probably the best:—Take any potato and hold it before you with the stem end (the place where it was joined to the vine) down. It will then be noticed that the eyes are arranged around the tuber in regular ascending rotation from the bottom to the top, similar to the thread of a corkscrew, each eye being a little above and further round the side than the one next below it. Now take the potato in the left hand with the stem end down, keeping it in a perpendicular position throughout the entire cutting. Take a sharp, thin-bladed knife and remove the first eye by placing the knife about equally distant between it and the eye next in rotation above it, sloping it to the indenture left by the stem, removing the flesh with it. When the first eye is removed, turn the potato round in the hand till the next eye appears; remove this one in the same manner, and keep on turning the potato—removing each eye as it appears in exact rotation, always sloping the knife to the stem. After three or four eyes are thus removed, the bottom part of the tuber will have a somewhat pyramidal form. After the first two eyes are removed, no further trouble will be found until the seed end is reached, and only a little care will be required to remove those closely clustered eyes. The sets should be planted as soon as cut, and a little hot lime thrown over them will absorb the moisture, prevent premature decay, and also the attacks of insects.

I will now describe an experiment I made some years ago in England. It had been announced by Messrs. Hooper and Co. that they intended offering special premiums, amounting to fifty guineas, to British cultivators for the largest amount of potatoes grown from 1 lb. of seed of two, then new, American varieties called Snowflake and Eureka. The novelty of the experiment attracted a great deal of notice in the horticulturist world, and I, amongst others, determined to become a candidate for the prize. My first business was to prepare the ground thoroughly, but, owing to want of space, was obliged to use ground on which I had grown potatoes for five years in succession. I

prepared 20 perches, by bastard-trenching it or, as it is commonly called, double-digging it to a depth of 18 inches. A crop of turnips which had been growing on it was utilised by chopping the turnips up and trenching them in with the bottom spit, with two cartloads of half-rotten leaves (not having any well-rotted stable manure). I then collected the following manures, and made them into a compost, which was well incorporated with the top spit:—10 bushels ashes from the garden refuse heap, 10 bushels leaf-mould, 2 bushels caustic lime, 1 bushel soot, 4 lb. sulphate of ammonia, 6 lb. sulphate of soda, 10 lb. nitrate of soda, and 10 lb. sulphate of potash. The caustic lime was used to hasten the decomposition of all the vegetable substances and thus make them available for the immediate use of the plant. On 26th March, I received 1 lb. each of Snowflake and Eureka. They were placed on a shelf in the seed-room and turned over daily, so that all the eyes might start simultaneously. In the meantime, a gentleman had been appointed as agent to supervise the planting and lifting of the potatoes.

The pound of Snowflake consisted of 4 tubers. No. 1 tuber was divided into 26 sets; No. 2, into 23; No. 3, into 18; No. 4, into 15—making a total of 82 sets.

The pound of Eureka consisted of 5 tubers. No. 1 was divided into 34 sets; No. 2, into 29; No. 3, into 25; No. 4, into 18; and No. 5, into 15—making a total of 121 sets. A little caustic lime was thrown over them as soon as cut. The drills having been struck 3 feet apart, the sets were at once planted, 3 feet between each in the rows, and were covered with about 3 inches of soil.

Finding that I had prepared too much ground, we weighed 1 lb. of Brownell's Beauty, consisting of two potatoes, which were cut into 43 sets, sufficient to fill up the spare space. A small experiment in the form of artificial draining was carried out with the Beauty, 20 sets in rotation being alternately placed on inverted flower-pots (24's), the pots being sunk to the required depth. When lifted, those grown on the pots were found to be of better shape, and averaged about $\frac{1}{2}$ -lb. per hill more than the alternating sets planted in the usual way.

A certain amount of care is required in cutting a potato into single eyes, so that each eye may take as equal a part of the tuber as possible, but still more care is required when *each eye* is to be subdivided into two or more parts.

Looking at a tuber of Early Rose, which had begun to grow by producing a spear half-an-inch long at several eyes, we shall find clustered there, round its base, several very minute buds, usually from two to six, so that an eye of the potato does not consist of one bud, but of several. If the tuber be planted in the usual way, but one bud from each eye, or at most two, would be called into action, the rest lying dormant. The object, therefore, of the cultivator in subdividing the eyes is that each bud should be brought into active growth.

To continue: Snowflake first made its appearance above ground, followed three days later by Eureka and Brownell's Beauty; the growth was weakly at first, but, as soon as the foliage began to develop, it was exceedingly rapid. It was interesting to notice the growth of sets taken from different parts of the same tuber. Those cut from the crown (although the smallest, some of them being only the third part of an eye and no larger than a pea) were the first to come up, and grew to be the more vigorous during the entire season. The sets taken from the sides produced average growth, and, though those cut from the base (stem end) were entire eyes and possessed a larger amount of tuber, they were a longer time in coming up, weaker in growth, and produced less weight of tubers when lifted.

On 7th June, 50 lb. of superphosphate of lime was sown among them as a top dressing, and at the same time they received a final earthing to the height of about 9 inches. They continued to grow most vigorously. The entire month of June was hot and dry. In the early part of July copious showers occurred, and after the middle of the month rain fell daily. I expected every morning

to see that the potato disease had made its appearance, and sure enough, on 21st July, the disease appeared on the Eureka, and it spread with rapidity to Snowflake and Beauty.

We, therefore, came to the conclusion that, as we appeared to have a fair crop, it would be advisable to lift the potatoes before the disease had communicated greatly with the tubers. The Snowflakes were lifted on 6th August, the agent being present; Eureka and Brownell's Beauty a week later. Each hill was weighed, packed in hampers, and carefully sealed by the agent. Some of the largest tubers were diseased, and were at once thrown away.

The following is an analysis of the culture and produce:—

EUREKA.—1 lb. of tubers, cut into 121 sets, produced 3 bushels per perch; 4 perches being occupied by this variety. When weighed at the Royal Horticultural Gardens, 647 lb. Loss from disease after lifting, 25 lb.

SNOWFLAKE.—1 lb. of tubers, cut into 82 sets, produced 2 bushels 5 gallons per perch; $2\frac{3}{4}$ perches being occupied. When weighed, $372\frac{1}{2}$ lb. Loss from disease, $32\frac{1}{2}$ lb.

BROWNELL'S BEAUTY.—1 lb. of tubers, cut into 43 sets, produced 3 bushels 5 gallons per perch; 1 perch 13 yards being occupied.

The comparison of produce stands thus:—

	lb.
Eureka—121 sets produced 	672
Snowflake—82 sets produced 	405
Brownell's Beauty—43 sets produced 	290
Total of sound tubers from 3 lb. 	1,367

The above plainly shows that the more the eyes of the potato are divided, the greater will be the produce from a given weight, provided that each set possesses a bud.

Success in carrying out experiments of this kind depends upon the combination of science with the art of culture. Science teaches us all the conditions of the life of vegetables, their elements and the sources of their nourishment, and teaches what particular elements are essential to every species of plants.

The art of culture embraces the principles on which the mechanical operations of culture are based in preparing the soil to make it accessible to the atmosphere—to its oxygen and its carbon. These must penetrate it in order to secure the necessary conditions for the vigorous development of the roots. The element present must be brought into that state of combination which will enable them to enter into plant life. In furnishing plants, therefore, with their mineral elements, we give them the power to appropriate carbonic acid from the atmosphere, which is there present in inexhaustible supply.

MONTHLY PROGRESS REPORT FOR JANUARY OF THE BIGGENDEN STATE FARM.

I regret to report the continuation of the worst drought ever experienced here, especially at this time of the year. The rainfall amounted to only 1.11 inches in three days. That small quantity, however, has been sufficient to bring up our crop of late corn planted during the first week of the month.

But the crop is now at a standstill, and cannot be expected to make any progress until rain comes.

In a similar manner, the cow peas and Mauritius and velvet beans are yet alive and green, but cannot possibly burst into bloom and fruit without at least a few good showers.

A few plants of sunflowers have made a remarkable growth in spite of the dry weather, showing thus what a grand stand-by that crop would be to both the cattle and the poultry farmer in time of drought.

We have kept both the orchard and the vineyard clean and well pulverised, thus minimising the destructive effect of dry weather.

We have also spent a few days in clearing, staking, and burning off old wood lying about in the paddocks.

We have harvested, with satisfactory results, a small patch of spring corn.

In the experimental plots all the varieties gave poor, ill-shaped, and useless "nubbins," except the Golden King, which have fine beautifully-shaped cobs covered with large well-nourished grains. To the numerous qualities of that beautiful corn we can now safely add hardiness and drought resistance. This may be explained by its exceptionally thick stems covered with a hard rind which acts as an efficient armour against sun-heat and the evaporation of the moisture supplied by the roots. We have fed the cornstalks to our horses, which took readily to the leafy and other tender parts, whilst the thick and hard parts of the stems have now to be wasted. I hail with impatience the day when the cornstalk shredders, described by Mr. Leahy in his interesting American reports (see *Queensland Agricultural Journal*, Vol. V., page 241), will be in use in this department, and amongst the Queensland farmers in general, as then the value of a corn crop will be doubled. Much valuable fodder, now mostly wasted, will then be turned into milk, beef, draught power, and manure.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1901.

Farm.

During the month 6·27 inches of rain fell, 6·15 having fallen in one night. This fall was accompanied by a heavy storm, which did a great deal of damage to the buildings and orchard. The rain was badly wanted, but it did not benefit the district to the extent that it would have done had it ranged over a longer period; the deluge simply flooded the ground to such an extent that the surface, after a few hot days, became baked, resulting in many of the seeds previously planted perishing; these we had to replant. The lucerne and other advanced crops, however, benefited considerably.

The *Paspalum dilatatum* grass, although under flood water for a considerable time, suffered no damage whatever, thus proving beyond all doubt that this grass will withstand flood as well as drought and frost.

During the month, 32 horses were kept constantly at work preparing the land for seed and planting the following crops:—Maize, 5 acres planted and 12 acres replanted; 6 acres pumpkins, 4 acres Cape barley, 5 acres giant sorghum; 4½ acres Early Orange cane, imphee, Hungarian millet, Planters' Friend; and 40 varieties millets; also beans and other seeds.

We harvested varieties of potatoes and onions; crushed a large quantity of malting barley for pig and horse feed; cut about 6½ tons of mixed chaff.

Garden and Orchard.

The heavy rain of 14th January did much damage to the trees in the orchard, three of the large fig-trees being blown completely out of the ground, and many others blown down; these last can be put up again. The grape crop has been very prolific, and the fruit of good size, especially the Royal Ascot and Black Prince. The figs have had a large crop of fine fruit, the two best varieties being White Adriatic and Brown Turkey. The vegetable crop, owing to the continued dry weather, was small, but marrows, watermelons, &c., were

plentiful. The onion crop has been harvested, and has turned out fairly well. The orchard and vineyard on the hill are in splendid condition. The usual seasonable work is now being pushed forward.

Dairy.

Fifty-seven head of cows were in milk during the period under review. One thousand eight hundred and eighty-six gallons of milk were treated in the dairy; 870 gallons producing 911 lb. of cheese, and 1,016 gallons giving 400 lb. of butter. The natural increase during the month comprised 1 pure Jersey and one grade Holstein. The exceptionally dry weather in the early part of the month caused a drying up of the natural pastures, and recourse was had to a quantity of ensilage which was stored in the small silo. This was fed to the cows, and also to the dry cattle, bulls, and sheep. Seven head of fats were disposed of.

Pigs.

The increase of pigs during the month was as follows:—

Pure Berkshires, 20 head, 9 boars, 11 gilts.

Berkshire Middle Yorkshire, 4 head.

Berkshire Grade, 5 head.

One purebred Berkshire sow died.

Sales for the month comprised:—Pure Berkshires, 3 boars; Yorkshire Middle, 1 boar; Berkshire grade, 15 head (baconers). The breeding sows and store pigs were fed on roots and green lucerne.

Mechanical Department.

In the blacksmith's shop the usual work, such as horse-shoeing and repairing implements, has been done. The storm on 14th January did some damage to the buildings, and, as a consequence, there had to be replaced on the hayshed more than half-a-ton of iron. At the implement shed, 70 feet of the back wall was moved out about 3 feet; this has since been put back to its original position. At the dairy, some thirty or forty tiles were broken; these have been stripped off, and new ones put on. Some iron was torn off the kitchen wing; this has also been straightened out and replaced.

The poultry-yards are now finished externally, but there are still houses to be erected as soon as the more pressing work is finished.

NEW METHOD OF SMOKING MEAT.

From America comes to us an invention which, if it performs all that is claimed for it, effects a marked saving in time, labour, and expense incidental to smoking meat. Messrs. E. Krauser and Bros., of Milton, Pennsylvania, have discovered a method of preparing liquid extract of smoke made from selected hickory wood. The *Florida Agriculturist* says that it has largely taken the place of the old-fashioned, clumsy process of smoking meats in a smoke-house, and is far cleaner and more convenient. The smoke extract is applied to the meat with a sponge or brush, and the meat so treated can be hung at once in the store-room. It contains the same ingredients that preserve the meat when it is smoked in the smoke-house. It keeps the meat sweeter and safer than the old way, improves its flavour, the process is perfectly healthful, and is a better safeguard against insects which frequently attack meats smoked in the old way.

Dairying.

DO NOT EXCITE MILCH COWS.

When we talk about preserving the quality of milk in hot weather, we must remember that some milk keeps better than others (writes George E. Newell, of Buena Vista, Col.) I mean by this that there are different grades of resistance to the action of degenerative bacteria, and that some milk will keep sweet and pure longer than other kinds under the same conditions. How is this to be accounted for? one would naturally ask. First, the healthfulness and vigour of the cow in a great measure warrant the healthfulness and purity of the milk, as does also the character of the food she eats. Pure, healthy milk will not sour or taint prematurely, unless under the most adverse atmospheric conditions.

One frequent cause of a rapid degenerative change in milk in hot weather—a cause that is often overlooked—is the overheating of cows prior to milking. To rush cows into the stable from the pasture, night or morning, is to excite them sufficiently to heat their milk to a feverish point, quickly deteriorating its quality.

So, in order to preserve milk in hot weather, aeration, ice and cold water are a mockery, unless the cows are kept cool and free from irritation. For this reason I have no use for even the most intelligent dog to assist in driving cows to and from the pasture. The presence of such an animal is sure to excite some nervous, sensitive cow, and such are usually the best milkers, and her lacteal yield if alone affected will leaven the whole herd.

Cows should always be handled and driven deliberately, and so none but experienced people who can always control their temper should be about them. Get up early enough in the morning so that you will not have to hurry the cows in from the pasture, and quit field work early enough at night for the same reason.

When a farmer ceases to consider dairying simply as “doing chores,” but comes to regard it as one of the most important interests he has on his farm, then, and only then, he is prepared to make his cows pay.

Never make dairying subservient to other work unless you have no need of a dairy income.—*Texas Farmer*.

GOUDA CHEESE.

In a recent article on dairying, the *Agricultural Gazette*, London, gave an interesting account of that Dutch product so familiar to the people of Europe—the Edam cheese.

There is, however, another variety of cheese, viz., the Gouda—in some respects similar to the Edam—which is very largely manufactured in the southern part of the same country, and which it is the purpose of the present article to briefly describe.

Gouda cheeses are larger than Edams, weighing generally about 10 or 12 lb., though they may vary from 8 to about 16 lb. each. In shape they may aptly be compared to that of the “curling-stones” used in the popular Scottish ice-game, though some of the cheeses may not be quite so deep.

THE MILK USED.

For the manufacture of Gouda, fresh sweet milk of low quality is used, and it is, of course, essential, when the best results are desired, that the milk be obtained in the cleanest manner possible, and free from taints of any kind. The quality of the milk, we have said, is very low, from the native breed of cows of the country.

HEATING THE MILK, COLOURING AND RENNETING.

Previous to renneting, the milk is thoroughly stirred and brought to a temperature of 88·92 degrees Fahr. in a round tub or jacketed vat. When the temperature has become constant, colouring matter (*e.g.*, extract of annatto) is added in the proportion of about $1\frac{1}{2}$ to 2 oz. per 100 gallons of milk and thoroughly incorporated. A large proportion of rennet extract is then well stirred into the milk, sufficient being used to produce a fairly firm curd in from fifteen to twenty minutes. The exact amount of rennet required for this purpose depends to so great an extent upon the strength of the extract itself, and upon the nature of the milk and other conditions, that it is not possible to state exactly what quantity to use; we may, however, say that we have used Fullwood and Bland's most concentrated extract in the proportion of $4\frac{1}{2}$ to 5 oz. per 100 gallons of milk with satisfactory results in a low-quality milk (3·2 per cent. fat) at a temperature of 90 degrees Fahr.

CUTTING THE CURD.

When the curd has attained about the same condition as is aimed at in the making of Cheddar cheese, it is gently cut with knives in the ordinary way, being reduced to fine cubes about the size of peas—rather finer, therefore, as a rule than in the case of Edam cheese. After removing, by hand, the soft curd which is found adhering to the sides of the tub or vat, the next operation—viz., scalding—is proceeded with.

SCALDING OR COOKING.

Scalding is performed in the usual manner, either by dipping out and warming part of the whey, and pouring it back into the tub, or directly, in the case of the jacketed vat, by means of hot water or steam. The temperature to which the whole is scalded may vary from 100 to 104 degrees Fahr., and the time occupied in raising the temperature is usually from half-an-hour to forty minutes. The curd is then kept continually stirred until it reaches the desired rubber-like consistency, which may take from fifteen minutes to an hour longer, when the whey, which at this stage should be quite sweet, is drawn off.

FILLING THE MOULDS, PRESSING, Etc.

The whey being completely run off, the curd is at once transferred to the moulds. Gouda moulds are made of heavy tin, and consist each of two parts, the upper part forming the cover and being made to fit neatly into the inside of the lower (principal) part. The complete mould measures about 6 inches in depth by about 10 inches across the middle. Perforations are provided in the sides of the moulds to allow for the escape of whey from the cheese.

The filling of the moulds is performed as speedily as possible, and great care is taken not to allow the temperature of the curd to fall much below 100 degrees. Each handful of curd is, before placing in the mould, squeezed to expel as much of the whey as possible. After filling, the moulds are transferred to the cheese presses, where they are subjected to a pressure amounting to an average of fifteen times their own weight, for half-an-hour. The cheeses are then removed from the mould and, as a rule, immersed for a minute or two in a bath of warm sweet whey, to give them a good coat, after which treatment they are enveloped in a winding bandage of unbleached calico or "cheese-grey." Before applying this bandage, it is a good plan to soak it in whey to make it adhere more neatly to the cheese. The first bandage having been applied, the cheeses are replaced in their respective moulds and again subjected to pressure, this time for an hour. On the expiration of this period, the cheeses are again removed from the moulds, the first bandage removed, and a second one of the same material put on very neatly in the same manner as the first, circular pieces of the cloth being used to cap the ends of the cheeses.

The cheeses are then once more placed in the moulds, and transferred to the presses, where they remain for twelve hours or so.

SALTING AND RIPENING.

After pressing, the moulds are removed, the bandages stripped off, and the cheeses placed on the shelves in the ripening-room.

The Gouda ripening-room is constructed in much the same manner as the Edam room, and the same conditions as regards humidity and temperature are observed. The air of the room must be kept decidedly moist, and an average temperature of about 58 degrees Fahr. maintained. The limits of 50 degrees to 65 degrees should on no account be exceeded, and the more constant the temperature the better the results obtained.

On the second day, after placing in the ripening-room, the cheeses are rubbed all over with salt until the salt begins to dissolve. This salting process is continued twice daily for ten days, by which time sufficient salt will have become absorbed. On the day after the final salting, the cheeses are washed with warm water and wiped quite dry with a cloth. They are then allowed to remain on the shelves, turning and rubbing them with the hand daily until ripe and fit for marketing, which may take from eight weeks to three months or longer.

PARTICULARS OF MANUFACTURE.

The following data relate to one day's manufacture on a small scale:—

Gallons milk used, $17\frac{1}{2}$.

Pounds green cheese made, $20\frac{1}{2}$.

Temperature of milk when rennet added, 90 degrees Fahr.

Ounces rennet extract used per 100 gallons milk, $4\frac{3}{4}$.

Temperature of scalding, 102 degrees Fahr.

Time occupied in scalding, 40 minutes.

Time from completion of scalding to drawing whey, 40 minutes.

Time from drawing whey to first bandaging, 1 hour.

Time from first to second bandaging, 2 hours.

Total time of whole operation, $5\frac{1}{2}$ hours.

PRESENT MARKET VALUE.

The present market prices of Goudas are 44s. to 50s., as compared with 50s. to 52s. for Edams, the factory-made article of either variety fetching a few shillings less.

RULES FOR MILK STATIONS.

A milk-buyer in Indiana, U.S.A., gives the following suggestions to those from whom he wishes to purchase milk. To carry out these directions will, he says, take a little extra trouble, but he expects to pay for the increased care:—

Keep nothing but the best, heavy milking cows, and then only when healthy.

Feed plenty of good, clean food, of the proper character and quality (a balanced ration).

Give the cows not only all the water they want to drink, but give it to them pure and fresh and frequently. Give a cow nothing to eat or drink that is not clean and sweet enough for human food.

Take the best of care of your cows; see that no uncleanness, dust, or dirt are on the side of the cow or her udder when you milk.

Milk at regular intervals and in the same order.

Strain through a clean cloth, and also aerate, if you can, each cow's milk into tall cans before you milk another.

Remove the milk from the barn as soon as possible.

Put the cans containing the milk into cold water, having the water higher on the outside than the milk is on the inside.

Have a dairy thermometer, and use it every time.

Stir the milk frequently and add fresh water, if necessary, until the temperature is below 60 degrees; better below 55 degrees.

Keep milk cold and where it cannot absorb bad odours.

Cleanliness and cold water, with frequent stirring, will preserve milk pure and sweet long enough to be suitable for our purposes.

DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

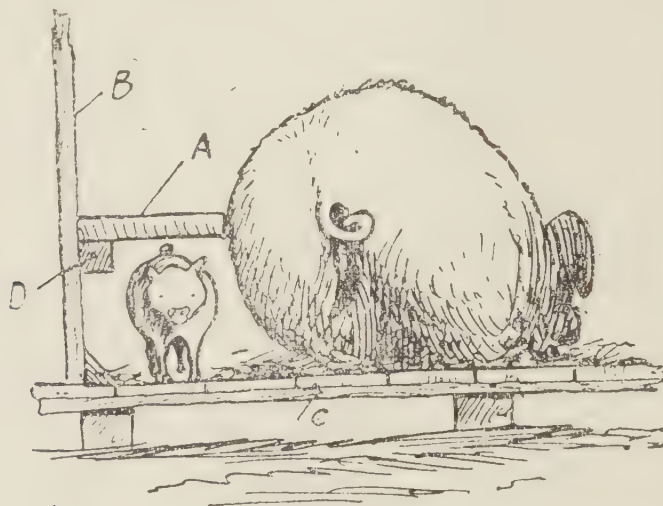
RETURNS FROM 1ST TO 31ST JANUARY, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Com- mercial Butter.	Remarks.
			Lb.			
Lavina ...	Ayrshire ...	6 April, 1900	442	3.9	19.306	
Rosebud ...	" ...	10 April "	563	3.7	23.33	
Ream ...	" ...	24 July "	604	3.7	25.02	
Isabelle ...	" ...	7 July "	598	3.8	25.45	
Lena ...	" ...	13 July "	586	3.8	24.94	
Leesome ...	" ...	1 Sept. "	792	3.8	33.7	
Ream Routhie ...	" ...	20 Sept. "	631	3.6	25.44	
Ruth ...	" ...	8 Oct. "	564	3.5	22.1	With first calf
Annie ...	" ...	8 Oct. "	422	3.0	14.1	With first calf
Laura ...	" ...	28 Aug. "	586	3.6	23.6	With first calf
Renown ...	" ...	29 Nov. "	573	3.7	23.74	With first calf
Laverock ...	" ...	19 Dec. "	918	3.8	39.07	
Jersey Belle ...	Jersey ...	21 May "	452	5.1	25.81	
Content ...	" ...	18 July "	559	5.2	32.55	
Playful ...	" ...	14 July "	713	4.4	35.13	
Baroness ...	" ...	3 Aug. "	548	4.5	27.61	
Carrie ...	" ...	18 Aug. "	521	4.1	23.92	With first calf
Spec ...	" ...	26 Aug. "	442	4.1	20.29	With first calf
Stumpy ...	" ...	29 Aug. "	685	4.2	32.22	
Evileen ...	" ...	2 Sept. "	589	5.1	33.64	
Beatrice ...	" ...	3 Sept. "	384	4.2	18.06	
Connie ...	" ...	8 Sept. "	548	4.2	25.77	
Ivy ...	" ...	28 Aug. "	524	4.2	24.64	
Bashful ...	" ...	2 Nov. "	475	4.6	24.47	
Russet ...	Grade Shorthorn	7 Oct. "	531	3.7	22.0	
Alice ...	" "	13 Nov. "	801	3.8	34.09	
Eva ...	" "	18 May "	542	3.9	23.67	
Stranger ...	" "	7 July "	653	3.7	27.06	
Duchess ...	" "	24 Aug. "	602	3.9	26.3	
Restless ...	" "	3 Sept. "	660	3.7	27.35	
Rosella ...	" "	5 Sept. "	724	3.8	30.81	
Lucy ...	" "	27 Sept. "	754	3.8	32.09	
Leopard ...	" "	29 Sept. "	661	3.6	26.65	
Redmond ...	" "	12 Sept. "	682	3.8	29.02	
Pet ...	Grade Jersey	14 Aug. "	431	3.6	17.37	
Fancy ...	South Coast	21 May "	498	4.1	22.86	
Violet ...	Shorthorn	9 Oct. "	561	3.7	23.24	
Gladdy ...	" ...	2 May "	364	3.8	15.49	
Louisa ...	" ...	6 April "	634	3.8	26.98	
May ...	" ...	20 May "	212	4.0	9.48	
Nestor ...	" ...	21 April "	462	4.1	21.21	
Spot ...	" ...	11 Sept. "	559	3.8	23.79	
Kit ...	" ...	28 Sept. "	590	3.8	25.11	
Brush ...	" ...	28 Sept. "	201	3.6	8.1	Dry, 31-1-01
Plover ...	" ...	3 July "	558	3.8	23.74	
Queenie ...	" ...	29 April "	363	3.8	15.43	
Frizzy ...	" ...	23 Aug. "	482	3.6	19.43	
Maggie ...	" ...	20 June "	311	3.9	13.58	
Laurel ...	" ...	10 Sept. "	713	3.8	30.3	
Empress ...	" ...	20 Nov. "	751	3.6	30.28	
Curly ...	" ...	10 Dec., 1899	692	3.7	28.67	
Trial ...	" ...	31 Oct., 1900	763	3.6	30.76	
Pansy ...	Grade Jersey	4 Dec. "	745	3.7	30.77	With first calf
Rusty ...	Grade Shorthorn	23 Dec. "	654	3.8	27.83	
Ginger ...	" "	19 Dec. "	837	3.8	35.62	
Effie ...	Jersey ...	6 Jan., 1901	542	4.5	27.31	
Damsel ...	Holstein ...	19 Jan. "	450	3.3	16.63	

The dairy herd grazed principally on natural pasture, and during the early part of the month were allowed one hour daily grazing on a lucerne plot. A quantity of ensilage was fed to them during the latter part of the month.

THE PROTECTION OF YOUNG PIGS.

Many young pigs are lost through farmers neglecting to take precautions against their being overlain by the sow in her brood house. The provision for the sow with a litter, of sufficient protection for her young, is an easy and inexpensive matter, and need cost but a trifling sum. The following scheme should be adopted:—Use 2-inch by 8-inch plank A around the interior of the house, about 10 inches from the floor C, the plank A being rendered more secure to the side B by the support D. The space thus provided under the



plank A is sufficient for the young pigs to crawl into, and the sow cannot overlay them owing to the protective plank projecting. The sow may not find this arrangement quite so comfortable as when she can get more surface support by lying at the side of the house, but it is not a difficult matter for her to take her ease under any sort of conditions, and, if she cannot lie up against the wall, she must support herself against the projecting plank. Anyhow, the farmer will find the arrangement serviceable.

FORESTRY IN CANADA.

Strenuous efforts are being made in the United States and Canada to preserve existing forests, to plant new ones, and to regulate the lumbering business. *Engineering* says:—

Forestry protection in Ontario, Canada, has been engaging the attention of the authorities of that province since 1897, when a commission was created for this purpose. Fortunately out of the 142,000,000 acres comprising the province of Ontario, about 120,000,000 acres are still owned by the Crown; though nearly 14,000,000 acres of the Crown lands are leased to lumber-men. The present commission is now making an effort to replant with trees the large areas that are fire-swept and are not suitable for agricultural purposes, and it also proposes to regulate the timber-cutting on non-tillable lands not yet denuded. A full report has been issued by Thomas Southworth, secretary of the commission, including a special report on forests and rainfall, presented by Mr. M. G. Butler, C.E., Ontario Land Surveyor.

The United States forest reservations, says the annual report of the Secretary of the Interior, now number thirty-eight, and cover 46,772,129 acres. The previous report gave thirty-seven reservations, with 46,425,529 acres. The new reserve is the Santa Yuez, in California, covering 145,000 acres; but the dimension of other reserves were changed during the year.

The Horse.

DISEASES AND DISORDERS OF THE ALIMENTARY SYSTEM.

By WILMOT C. QUINNELL, M.R.C.V.S. LOND.

CONSTIPATION OR TORPIDITY OF THE BOWELS.

Irregular and insufficient action of the bowels is one of the most common of ailments; there are few horses, if any, in fact, who have not at some time or other suffered from it.

Various causes may give rise to this condition in the horse—some of them serious or even fatal (strangulation of the bowel), while others are simply and easily removed.

It may be due to intestinal obstruction from improper feeding, or deficient secretion of fluids in the digestive organs, or upon diminished peristaltic action—imperfect muscular motion of the bowels—most often to both these causes combined, and are, in their turn, chiefly due to dietetic errors, though they may depend upon other causes also.

The early symptoms generally manifested in constipation: the motions are attended with difficulty, and straining or tenesmus is not unfrequent; the abdomen is distended, but the pulse and respiration are little, if at all, disturbed.

The retention within the organism of matters which should be regularly evacuated as they are formed, and their consequent absorption into the blood and tissues of the body often leads to a whole train of unpleasant symptoms—irritability, lassitude, and debility; fulness, distension of the abdomen, and many other discomforts may be due to this cause.

If the constipation is prolonged or continue unrelieved, the appetite becomes impaired, weakness follows; this state of matters may continue for a few days, and then the animal becomes nauseated and sinks. Stupor sometimes precedes death, whilst in some seasons and localities most of the bad cases are accompanied by excitement and frenzy.

In severe and prolonged cases of constipation actual obstruction of the bowels (ileus) may result, and often the gut becomes so distended and its muscular power so enfeebled that the restoration of a healthy condition is impossible.

In some instances a yellowish, gelatinous, mucous secretion is discharged in cases of constipation depending upon retention and impaction of the fæces; the discharge may be mistaken for diarrhœa by the uninitiated, when in reality it is indicative of a costive condition of the bowels.

Treatment.—This will depend upon the cause of the constipation, and it is generally better to get skilled advice in order to discover this.

All that is necessary in cases of mild constipation, or when the bowels are but slightly costive due to improper feeding, copious enemias of tepid water, and soap should be administered, and a dose (about a pint and a-half) of linseed oil given by the mouth is a safe and most satisfactory means of procuring an evacuation. Little, if any, food should be allowed, and that of a sloppy nature. Exercise at a slow pace is efficacious in most instances. If the condition becomes a chronic and habitual one, it must be combated by an occasional dose of aloes; and gentian, quinine, or other vegetables tonics in moderation.

For the prevention of the recurrence of constipation, bran mashes combined with boiled linseed should be allowed the animal from time to time.

Constipation may often be avoided by judicious regulation of habits and diet. Attention to the latter is of prime importance, and the hygienic treatment is of far more importance than the medicinal. Further medicinal remedies such as purgatives may be employed; constipation may be seriously aggravated by their injudicious employment. Again, when a large dose of some purgative is administered to an animal, and produces very free action of the bowels, temporary relief but increased constipation is almost sure to follow.

THE MOUNTED INFANTRY HORSE OF THE FUTURE.

Sir Richard D. Green Price, Bart., contributes a very interesting article on "The Pony: Its Breeding for Army Purposes," to the *Live Stock Journal* almanac. "The pony," he says, "has suddenly sprung into an importance such as, when I penned an article many years ago in the pages of *Bailey's Magazine* on his virtues, was quite unexpected. His admirers are now many, his historians are great, and his value has increased. It has been discovered (as I contend it ought to have been long ago) that ponies are an essential factor in modern warfare. I have many personal assurances from officers in the army, and men fresh from South Africa itself, that, without their ponies, the Boers would long ago have been conquered, and that those in our colonial and Lovat's scouts' ranks have been of the greatest value to our service. It was only a few weeks since that I had the testimony of my son, an Imperial Yeoman, who has been through the whole campaign, and who, writing home, said: 'You are doing good work in strongly advocating the use of ponies in our army service; they have fairly outlasted the bigger horses in this campaign, and without the aid of our mounted men the infantry would have been unable to tackle the Boers. They (the infantry) have been marched to death in the impossible task of cornering a well-mounted enemy, and in this the yeomanry and colonials have been invaluable.'

"It would have been well for us had we purchased in the first instance Basuto ponies instead of leaving them for the Boers to become possessed of. The authorities have imported to South Africa some 20,000 small horses from South America, besides a large number from Texas, but, according to the best opinions I have been able to glean, they have proved soft beasts, and not satisfactory remounts in the great majority of cases.

"So many reforms are likely to follow in the wake of this great Boer war that it is perfectly safe to expect that our heavy cavalry will be almost done away with, and that lightness, quickness, and smallness will be the points of efficiency to be aimed at. Beyond this, it would not surprise me to see one or more companies of mounted men attached to every regiment of infantry, and to these the pony will be essential. Easy to mount and dismount, easy of carriage, of good constitution, of less target for the enemy, and easier obtainable in foreign countries than the larger horse, it needs little argument to prove that the pony, not over-weighted, will be the exact requirement of our mounted infantry. Indeed, I may state as a fact that the War Office have already approved the formation of a pony regiment for the district adjoining the New Forest, in Hampshire.

"Taking all these circumstances into consideration, it stands to reason that the future breeding of our ponies is worthy of much thought, that the supply should keep pace with the demand, and, above and beyond this, that quality and excellence should go hand in hand with quantity.

"Thousands of ponies could be bred in Radnorshire alone, where 100,000 acres of hill-land have hitherto been devoted to sheep-pasturing. It is on the high lands of South Africa—viz., in Basutoland—where the hardy ponies are bred.

"The idea of raising what I may call the nucleus of pony battalions in Great Britain may sound a crude one, yet there are many far-seeing men who would fain agree with me and have already began to pave the way by breeding to a type of improved riding pony. Here the thoroughbred or the best type of Arab, on the sire's side, is the one most likely to succeed, and the height to be aimed at is from 14 hands to 14 hands 2 inches. Our agricultural societies and horse show societies are beginning to recognise the importance of including ponies in their prize lists." As to the sort of horse the small war-horse of the future should be, the writer says:—"We can only picture him in our mind's eye as an animal of about 14 hands 2 inches, with courage written on his

countenance and docility in his eye, strong of neck, with shoulders well set into a short powerful back and loins, wide in the hips and thick-set in the buttocks, a full, well-set-on tail (undocked), his legs short and straight, with clean bone and sinew throughout, and feet to match—in fact, a miniature dray horse with the activity of a high-class hunter. Breed such a one as this, dear friends, not by tens, but by hundreds and even thousands, and you will be rendering a service to your country.”

The horses which have been and are being purchased for the Fifth Queensland Contingent, shortly leaving for the seat of war, by Lieutenant-Colonel Irving, Principal Veterinary Surgeon, are as far as possible of the type above described. Great care has been exercised to obtain none but strong, active, healthy, hardy horses of small height, suitable for the mobile movements required against the Boers.

Home Liniments.

A correspondent, writing from Yeulba on the subject of home liniments, sends us a recipe for a very simple and, as he says, effective liniment which he has tested for the past thirty years on both man and beast. It was first brought to his notice in England by seeing a valuable draught horse being taken to a knacker's yard to be destroyed. The animal was supposed to have slipped with his load on the London stones, and so damaged the stifle joint that the vet. who was called in advised its destruction. However, a neighbour brought a bottle of liniment, dressed the joint, and told the lad in charge to take the animal home and dress the affected part three times a day for two or three days. This was done. In five days there was a great change, and in ten days the horse was at its work again.

Six months after this, our correspondent had a horse fearfully injured between the coronet and fetlock joint by a spiked paling. He obtained some of the liniment, and, although it took weeks to heal the wound, the animal recovered perfectly. The recipe is remarkable for its simplicity. Take two eggs; chip one end so that the shell will cover the neck of an ordinary wine bottle. Pinhole the other, and blow the contents into the bottle. Then add $\frac{1}{2}$ -pint spirits of turpentine and $\frac{1}{2}$ -pint best imported vinegar. Shake the bottle till the ingredients are well mixed; in about two hours, with frequent shakings, a white liniment will be produced, of about the consistency of cream, when it is ready for use, and will improve by keeping. If found too strong for a very sensitive wound, pour the liniment into a saucer and reduce by adding a little milk.

When used on human beings, it should be applied with the palm of the hand or a bit of flannel, and, if relief is not obtained, make a pad of flannel, sprinkle the liniment freely on, and tie it on the part affected.

Poultry.

DISEASES OF POULTRY—HOW TO TREAT THEM.

FOWL CHOLERA.—This is one of the greatest scourges of the poultry yard. Fortunately, it is not of frequent or general occurrence in this State. Uncleanliness and overcrowding are great contributors to this disease, but we have seen scores of fowls die of cholera on our own farm, where the birds had the whole farm to roam over and roosted at night in the open air with only a shelter of bark over their heads. There is practically no cure for the disease.

BRONCHITIS.—Young chickens often develop this disease in wet weather, which can generally be cured, if taken in time, by removal of the affected chicks to warm quarters and feeding them on soft food only, with mustard, ginger, or some hot spice added to it. Give them also a teaspoonful of glycerine twice a day.

ROUP.—Roup is one of the highly contagious diseases, and is mostly communicated to healthy birds by the medium of the drinking trough. One sick bird will by this means infect a whole flock. The disease is easily recognised, as the bird's head swells and a foul discharge proceeds from the eyes and nostrils. When the disease has made great headway, it is safest to kill the bird, because a disgusting fungus has grown in the throat, giving rise to the term "diphtheric roup." It is then very dangerous and is communicable to children. The remedies are given in most publications devoted to poultry. Isolate the affected birds; disinfect all their roosts, nests, and houses; destroy or at least thoroughly cleanse with disinfecting fluid all drinking and feeding utensils, and for some time afterwards add a little Stockholm tar to the drinking water. As for the affected fowls, bathe their heads frequently with hot water and Condy's fluid. Use a syringe to clean the nostrils and throat, injecting a solution of bluestone and warm water, sufficient bluestone to turn the water pale-blue. Be sure to prevent the bird swallowing any quantity of this as it is a poison. On first observing the symptoms of roup, give the bird a dose of Epsom salts. Afterwards the best treatment is a pill containing 2 grains of quinine, morning and night. The only certain way to prevent the reappearance of disease is to kill the affected birds and thoroughly cleanse and disinfect the houses and runs.

SCALY LEGS.—The cause of scaly legs is a kind of mite which burrows into the skin and causes white scales to appear. Some recommend kerosene as a remedy, but this is too severe; birds often become lame from its application. The best way is to soak the legs in warm water for five minutes, and then rub them with a stiff brush to break the scabs. Then rub in a mild arsenical wash, or sulphur ointment made of 10 parts lard, 3 parts sulphur, and 1 part crystallised carbolic acid. Usually one application will suffice, and a cure will be had in three or four days.

LICE.—Fowls are infested by four genera and about twenty species of bird-lice. The best treatment for the bird is the dust bath and thorough spraying with powdered sulphur and tobacco dust for the house. Here a hot kerosene emulsion is most effective. Thoroughly spray all the roosts and boxes. Remove the droppings at least once a week. Lice breed in the droppings. The dust bath should be made either in a hollow in the ground or in a roomy enclosure made of three sheets of galvanised iron. Put a quantity of dry road dust in this, mixed with wood ashes and a little tobacco dust. The object of the bath is to destroy the insect parasites. As these do not breathe through the head but through pores in the body, the dust chokes the pores and the insects die.

GAPES.—The gape-worm (*Syngamus trachealis*) is the most destructive of all the parasites of poultry. It infests the windpipe and bronchi of most land birds, but never of water fowl. The symptoms are the well-known gaping cough or sneeze. The bird seems about to choke.

Treatment.—First remove all the healthy birds to some other place; then kill all the badly infested birds and burn them. If you bury them, earthworms will find and eat the eggs of the parasite and convey the disease to other fowls. Then thoroughly disinfect the pens and yards by sprinkling with a diluted solution of sulphuric acid (2 or 3 pints to 25 gallons of water). If acid is not procurable, use kainit or air-slaked lime, and dust the yards liberally with it. Then give one teaspoonful of turpentine and one of assafœtida in a warm bran mash to each 25 birds. A pill of camphor, the size of a wheat grain, pushed down the throat has often given good results. Another good remedy is to remove the fluff from a small feather, except the tip. Moisten this with turpentine or kerosene, and carefully push it down the windpipe, twisting it round. It will kill all the worms it touches, but cannot reach those in the lower bronchial passages. Turpentine and assafœtida in the food soon load the fowl's breath with their fumes, and so kill all the worms in the lower as well as in the upper passages. For drink, give the birds a solution of salicylic acid—one-third ounce to a quart of water.

A MONSTER INCUBATOR.

A Sydney paper says that New South Wales has surpassed the Egyptians and Chinese in the utilisation of the incubator on a large scale.

The largest duck farm in the United States is in Massachusetts, on which 30,000 ducks are raised and hatched annually. The largest in Australia is at Botany, where also is installed an enormous incubator, having a capacity of 11,440 duck eggs or 14,080 hen eggs. It is not necessary that it should be filled at any one time. The eggs can be put in at intervals, as they are available. With fifty eggs only, it will work just as well as if it were filled. The incubator, which was designed and constructed by its proprietor, with the aid of an ingenious local mechanic, is on the hot-house principle; in fact, it is a hot-house. It stands in the open, and is constructed of ordinary pine weather-boards, with a corrugated iron roof. The inside measurements are 9 feet by 11 feet by 7 feet in height. The egg trays each hold 130 duck or 160 hen eggs, and there are four of these end to end in eleven tiers, one above the other, on either side of the room, or a total of eighty-eight. Moisture is supplied in pans beneath the bottom tiers of trays. One of the strong points about the room, and perhaps the most surprising, is the regularity of the temperature. Since it has been started it has hardly varied a degree, but experience has shown the unwisdom of having various sets of eggs at all stages of incubation in the one temperature. Eggs during the first few days of incubation require an actual temperature of 7 degrees to 9 degrees higher than during the last few days. That is, the eggs, as the young life grows, generate an increasing amount of heat. To counteract this, the temperature of the room is regulated, enabling the eggs in the early stages to be kept as low as 95 degrees, while those during the last week range about 102 degrees. The early eggs are also placed nearest the steam pipes. "I have never seen any incubator that could touch it for that," said the proprietor. The first hatchings gave 43 per cent., and the proprietor, with the eye of an expert, considered that those about due would go about 50 per cent. "If I got an average of 50 per cent. from all my eggs," he says, "I would be well satisfied." So far this season his incubators—he has all makes, colonial and American—have given from 10 to 80 per cent.; and since he began hatching in June (the Australian midwinter) he has lost over 8,000 eggs in incubation. At present he has about 5,000 ducklings which he is bringing on for the Australian market.

GLASS FOR POULTRY.

For the purpose of triturating their food, fowls require good sharp grit. There is nothing better for this than pounded glass. It should not be ground to a fine powder, but merely reduced to the condition of grit, when it will serve the purpose far better than any gravel, sand, or oyster shells.

WASHING FOWLS FOR EXHIBITION.

Only light-coloured birds require washing, as a rule, for show purposes. Few amateurs know how to wash a bird in such a way as to present it in all its spotless beauty. An English poultry expert says that to wash birds properly one should first see the operation performed by an expert.

Rain-water only should be used, and three separate bucketsful are required, the first being warm and the other two cold. A good white soap is required, and a thorough lather worked up through the whole plumage of the bird. Never rub against the web of the feathers; always with. When the soaping has been thoroughly done, wash every particle of soap off in the second water; then put just a squeeze of the blue bag in the third water, and immerse the bird in it. This will bring out the purity of the colour. Drying must be carefully performed with soft towels before a fire, and the bird put in a hamper with clean straw for the night. It should be kept until the show in a separate pen, with any amount of chaff on the floor, and the droppings cleaned out daily.

All that the dark ones need is a good rubbing down with an old silk handkerchief, and a thorough scrubbing of the legs with soap and water. Comb, face, and wattles should also be sponged clean, and carefully dried afterwards.

A FAT GOOSE.

Most people have heard the saying that "a goose is a foolish bird—it is too much for one and not enough for two"; that is, from a gastronomic point of view. It would open some people's eyes if they could realise the price per lb. they pay for the edible portion of a goose. A gentleman in England tested this question. He bought a 12-lb. goose for 9s., and paid 8d. for plucking it. When plucked and drawn ready for the spit, it weighed 7 lb. only. When eaten (the carcass well stripped of its flesh), the bones weighed exactly 2 lb., and, allowing $\frac{1}{2}$ -lb. loss of weight in the cooking, there remained barely $4\frac{1}{2}$ lb. of actual meat to satisfy a craving appetite! Something extra is certainly made up by the addition of sage and onion stuffing, but the goose can lay no claim for this, however much he may boast of having stuffed himself with corn when alive. A fat goose may be "food for the gods," but certainly not for poor folks who have to pry into such details. A 12-lb. goose is a very plausible-looking bird when cackling in a farmyard, as well as distinctly satisfying in appearance when dished for the table, but his carcass presents but a sorry sight to look upon after one hungry man has dined off it and his 9s. 8d. gone!

During the nine months from egg-shell to slaughter, a goose consumes at least 250 lb. weight of herbage, corn, and meal to produce this $4\frac{1}{2}$ lb. of meat. Where does the profit come in, to those who rear them to sell at 8d. per lb., or those who eat them at 2s. per lb.? The writer concludes with the query: If a "gentleman" can eat up a $4\frac{1}{2}$ -lb. pheasant without shocking his friends, why should not a working man polish off a 12-lb. goose without being called a pig or a glutton? Where is the logic? Each has but $4\frac{1}{2}$ lb. to negotiate. Moral—Let me say with Job, "O that mine enemy may 'fatten geese,'" or to be less irreverent and more exact, "write a book."

The Orchard.

AN APPLE-TREE REPORTED TO BE IMMUNE TO AMERICAN BLIGHT

M. G. Lavergne, Director of the Station of Vegetable Pathology at Santiago, Chili, calls attention in the *Journal de l'Agriculture* to a new variety of apple, named Hindobro, declared to be entirely unattackable by the woolly aphis, commonly called American blight, and other pests. This is a somewhat extensive claim, and it is hardly to be credited that there is any variety immune to all pests, if this be meant. Probably the "other aphides" would more correctly describe the intended claim. But immunity to the pestilent woolly aphis alone would be quite high enough as a recommendation, provided that the apple be a good one, and it is described as a fruit of good size, bright colour, and fine flavour. M. Lavergne states that abundant evidence has proved the immunity of the apple to woolly aphis, even when it is grafted upon an infested stock. The variety was raised or obtained, and has been multiplied by, M. Salvador Izquierdo, proprietor of the immense nurseries at Sainte-Inez-de-Nos, near Santiago.—*Scottish Farmer*.

POMEGRANATES

The pomegranate fruits freely in Queensland, but no use is made of the fruit. The *Florida Agriculturist* points out that a good market for this fruit exists in New York. It is a highly popular fruit among certain classes, and is worth from 5 to 6 dollars (£1 to £1 5s.) per crate. The demand is yearly increasing—the more it is known, the more popular it becomes. Enough cannot be procured to supply the market. The *Agriculturist* does not state how many fruits are contained in a crate. Still, here may be another opportunity for Queensland orchardists.

THE BANANA.

The banana seems much to the front at the present day, and comes in for a good deal of laudation: the banana plant (says M. de Lovedo, in *El de Progress Mexico*) will feed 150 men from the product of one hectare ($2\frac{2}{5}$ acres) of land so planted; while the same area in wheat would only supply food for six individuals; for the same space and under similar conditions of cultivation, its produce is 40 times that of potatoes and 100 times that of wheat. The fruit of the banana contains 72 per cent. of water, 2.14 per cent. of nitrogenous matter, and 22 per cent. of saccharine substances, the latter giving it its great nutritive quality.

In connection with the above, it will be interesting to our readers to know that Mr. J. Harding, of Geraldton (North Queensland), has been most successful in preparing dried bananas. Last month that gentleman brought to our office a sample of dried bananas, of exquisite flavour, texture, and appearance. The fruit was quite soft, softer than dried figs, and light-brown in colour. Mr. Harding stated that anyone could prepare them. All that is necessary is to take the bananas before they begin to turn yellow, peel them and place them on trays in the sun, taking them indoors in the event of a shower. In three weeks the evaporation is complete, and the prepared fruit can be safely packed. Notwithstanding such a simple means of preserving a crop, thousands of bananas are annually allowed to fall and rot on the ground.

WHEN WILL THE PECAN BEAR ?

An orchardist, writing to the *Dallas* (U.S.A.) *News*, says:—We find various opinions asserted as to when a young tree begins to bear, all in accord with the experience of the respective persons, ranging from five to ten years. I have heretofore claimed that age cuts no figure as it does in fruit trees, and further experience convinces me that I am right—that size of tree alone determines this period. Congeniality of soil and good attention determine the size more than time, and brings about the bearing period. Whenever this size and height is obtained, if in five years the young tree will bear; if not reached in 100 years, it will not bear. Hence the importance of promoting quick growth by every means possible in selecting the most congenial soil and planting that which gives the best send off of nut or scion. The size of tree in bearing often varies. But upon these general limits can depend. No young tree is apt to bear until it reaches the height of 8 feet and has a well-grown trunk and heavy top, and every tree is apt to bear by the time or before it attains 15 feet in height, unless crowded so as to run up like a fishing-pole. The first fruits are very scant, two or three nuts to a handful on a tree. But, after the taproot strikes water or permanent moisture and congenial soil the growth is very rapid as well as the increase in bearing. Twenty-four to 30 feet is a pretty and convenient distance to plant the nuts. This gives room to cultivate between rows.

The Pecan nut grows well at the foot of the Main Range, near Toowoomba, in this State. Mr. H. L. Pentecost, whose date-trees we illustrate in this issue of the *Journal*, has thirty-seven Pecan trees, and according to the treatment they received have grown accordingly. Some dozen or so of them will average 9 feet in height, and look splendid; they had no drawbacks. Others range from 9 feet to 2 feet in height. The cause of their being stunted is attributed to ignorance on the part of a working man, who banked the earth up around the trees—in some instances as much as 1 foot; it killed several of the trees, and stunted the rest. However, Mr. Pentecost says they are recovering rapidly by rational treatment. There are no signs of fruit yet, nor does Mr. Pentecost expect any for twenty years. Very few take the necessary care in transplanting these trees. One has to dig down nearly 3 feet to get to the bottom of the tap roots to get any fibre roots.

EXPERIMENTS IN PACKING AND MARKETING APRICOTS FROM WESTBROOK STATE FARM.

By S. C. VOLLER.

Fruit-growers who read this *Journal* may be interested in the following notes on this work as carried out during the present season, and I think they will find at least a little that will be of value to them. The object of these experiments was to find out the relative value of different methods of packing and marketing fruit, or, in other words, to try and show that it pays to take a bit of extra trouble in getting stuff up for sale. I will leave my readers to judge for themselves after reading this.

The desire of the grower is, naturally, to get as high a price as possible for his product, but unfortunately he does not always get what may be considered a good price; sometimes he gets a very poor one. This may be accounted for in more ways than one. The market may be overstocked, or the fruit itself may be of inferior quality, or, if the fruit is of good quality, it may have been handled and put on the market in such a fashion as to open up in bad or partly damaged condition. But it is possible for the grower to avoid disappointment and to make sure of his results by—first, growing only the best fruit and in the best way; and then, secondly, putting it before the public in such a way as to attract in spite of all competitors.

While we have some growers who are alive to the importance of quality and "get-up," there are many who seem to remain in ignorance of the low value of their inferior methods of work, and my desire now is to show any such how they may effect an improvement. While there must of necessity be a considerable quantity of fruit in a decent crop which has to be classed as seconds, and will not pay for fancy handling and "get up," yet there should be a good run of fruit of *No. 1* and "extra" quality that is too valuable to tumble into ordinary cases, to be rubbed and bumped about until it is sold. Under that treatment, which is the common method, the fruit simply loses quality all the time, and frequently gets reduced to pulp.

My packing was done as follows:—All *No. 2* stuff and some *No. 1* were packed in ordinary fashion, in new cases made on the farm, being half the size of the Shoobridge Tasmanian apple case, dimensions 20 by 10 by $7\frac{1}{2}$ inches.

Some *No. 1* and all extra quality were paper-wrapped, packed in cardboard boxes of sizes as follows: 6 by 6 inches, 12 by 6 inches, and 12 by 12 inches; depth being 2 inches for some, and $2\frac{1}{2}$ inches for others, to accommodate different-sized fruit. These cardboards were again packed in crates holding four or five layers, with light shelves between of $\frac{1}{4}$ -inch stuff, to prevent crushing or bumping. Results came out thus:—Taking the small cases, ordinary packing, and comparing prices obtained for *No. 1* and *No. 2* respectively, I find a strong appreciation of quality shown by the buyers, as *No. 1* fruit averaged 4s. $7\frac{1}{2}$ d. per case at auction, while *No. 2* fruit averaged 2s. $10\frac{1}{2}$ d. per case—a difference of 1s. 9d. per case. Now, before going any further, there is a point here worth the attention of growers—viz., the good fruit sells much more readily than the inferior. Also, let it be noted—it takes *fewer* fruit of the better quality to fill the case, meaning less handling from the trees right through. Still further: It will pay the grower, by good cultivation and thinning out his crop, and by giving careful attention all round, to grow the larger and better quality for the higher price than to grow the smaller and inferior for the lower figure.

But, to my mind, more interesting results still were obtained in the crate-packing. Comparison of contents and prices obtained at per dozen for cases and crates, respectively, comes out strongly in favour of the crates. I attach to this article a table showing these results. The fractions are not all worked out to an exact point, but are quite near enough for practical purposes.

I would especially call attention to the results of the Christmas sales. It was there that the most useful experiment was made with what I have called *No. 1* quality in fancy packing, and, although this class is not of such a convenient size to handle in paper-wrapping work as the "extras," the returns show that the trouble is paid for handsomely. For instance, the *No. 1* fruit in cases realised at Christmas sales 6s. per case, less 4d. cost of case = 5s. 8d. If the contents of those cases had been all fancy-packed, they would have fetched 2s. 8d. more per case. This is the rate realised by the same quality fruit in fancy packing.

I say nothing in my table of freight and commission, because—1st, I only want to show the comparative selling value of the fruit under the hammer; and, 2nd, because freights may vary considerably according to the distance the grower may be from the market, and the convenience for getting there.

One great advantage which should be borne in mind as coming from the fancy packing, is the advertisement which is afforded to growers. All the little cardboard boxes with their contents go directly into the hands of the public, and many are purchased by the travelling public. These boxes are carried all over the place, and, when they bear the name and brand of the grower, as they should do, it is impossible for the public not to notice the information thus conveyed; and, if the quality and "get up" of the article are what they should be, a reputation is at once established.

I know that Westbrook State Farm got a good advertisement in this way, as each cardboard box bore the number and name of contents, mention of quality, the State Farm brand, and my own initials.

Thus, for example:—

3 Doz. Hemskerke 'cots
Extra Quality
State Farm
Westbrook
S.C.V.

TABLE SHOWING RELATIVE VALUE OF DIFFERENT METHODS OF PACKING APRICOTS.

	£	s.	d.		£	s.	d.	Per dozen. d.
1. Cost of crate	0	0	10	Contents of crate—8 boxes, of 3				
Eight cardboard boxes, 12 × 12	0	1	4	dozen each = 24 dozen				
× 2 inches, @ 2d. each				Average price realised for	0	10	9	
Wrapping paper	0	0	2	crates				
				Less	0	2	4	
	0	2	4					= 4½
2. Cost of crate	0	0	10	Contents of crate,—16 boxes, 1½				
Sixteen cardboard boxes, 12 × 6	0	1	8	dozen each = 24 dozen				
× 2 inches, @ 1½d. each				Average price realised ...	0	10	9	
Wrapping paper	0	0	2	Less	0	2	8	
	0	2	8					= 4
3. Cost of crate	0	0	10	Contents of crate—32 cardboard				
Thirty-two cardboard boxes, 6	0	2	0	boxes, 9 fruit each = 24 dozen				
× 6 × 2 inches, @ ¾d. each				Average price realised ...	0	10	9	
Wrapping paper	0	0	2	Less	0	3	0	
	0	3	0					= 4
4. Cost of crate	0	0	10	Contents of crate—8 boxes, 3½				
Eight cardboard boxes, 12 × 12	0	1	4	dozen each = 28 dozen				
× 2 inches, @ 2d. each				Average price realised ...	0	10	9	
Wrapping paper	0	0	2	Less	0	2	4	
	0	2	4					= 3½
5. Cost of case (ordinary packing)	0	0	4	Contents of case—20 dozen No. 1				
				Average price realised ...	0	4	7	
	0	0	4	Less	0	0	4	
								= 2½
<i>Christmas Sales.</i>				<i>Christmas Sales.</i>				
6. Cost of crate	0	0	10	Contents of crate—8 boxes, of 3				
Eight cardboard boxes, 12 × 12	0	1	4	dozen each = 24 dozen				
× 2 inches, @ 2d. each				Price realised	0	14	0	
Wrapping paper	0	0	2	Less	0	2	4	
	0	2	4					= 5¾
7. Cost of crate	0	0	10	Contents of crate—8 boxes, of 3½				
Eight cardboard boxes, 12 × 12	0	1	4	dozen each = 28 dozen No. 1				
× 2 inches, @ 2d. each				Price realised	0	14	0	
Wrapping paper	0	0	2	Less	0	2	4	
	0	2	4					= 5
8. Cost of case (ordinary packing)	0	0	4	Contents of case—20 dozen No. 1				
				Price realised	0	6	0	
				Less	0	0	4	
	0	0	4					= 3½

FRUIT-GROWING EXPERIMENTS AT WESTBROOK STATE FARM.

The following very valuable and interesting report forwarded to the Secretary for Agriculture by Mr. S. C. Voller, Assistant Instructor in Fruit Culture, Department of Agriculture, should be read carefully by all fruit-growers. The problem of how to deal with the fruit fly appears to have been much simplified by Mr. Voller's method, and the results, as shown by the splendid fruit produced by the young trees at Westbrook, would certainly appear convincing. There is no man too young or too old to learn something, and, as the Department freely invites all interested in agriculture to visit the State Farm, it seems strange that so few avail themselves of the privilege, yet constantly bewail their losses owing to fruit fly and other insect pests:—

Following my recent report on apricot packing at Westbrook Orchard, I wish now to lay before you a further report with reference to the later fruits, and also the experiments I have carried out in connection with the fruit fly. You will doubtless remember that the late frosts of last spring did very serious damage to all of our fruits, as some of them occurred just at the blossoming time, and others when the fruit was setting or had actually done so.

Of course, against a trouble of this kind we are practically powerless, especially on the Downs country, where most of the land is considerably exposed.

However, in spite of this drawback, we had a sufficient setting of fruit to give us a decent idea of the capabilities of the place and also of the district; and I think I am not going too far when I claim for the Westbrook Orchard that it has shown itself capable of producing as fine a quality in many lines of fruit as can be produced in any part of Australia. This being so (and I think it is correct), we surely have something on which to congratulate ourselves.

Before dealing with the later fruits, I desire to give a short account of the apricots, nearly all of which were of splendid size and quality. I give date of ripening, as showing what often constitutes special value for catching an early and comparatively bare market. This is a very significant point in our work, when we remember what, indeed, must never be lost sight of—viz., the value of our experimental work to the growers throughout the country who are intended to profit by such operations. I would also like to say here that it is a matter for strong regret that so few of those who are engaged in fruit culture ever take the trouble to visit our State orchards with a view of getting what may prove very valuable information to them. I do not remember to have ever met one of the local men at the Westbrook Orchard. Still, I consider that it is only a question of a little time when they will feel obliged, in their own interest, to pay attention to our doings.

APRICOTS.

RED MASCULINE.—Ripe 15th November, size small; quality fair, inclined to split, crop prolific. The defects of small size and tendency to split were due mainly to the facts—(1st) that the rain came too late to allow any real benefit to such early fruit, the best rain only coming in November, and (2nd) that when the rain did come a sudden rush of sap occurred, which was more than the hitherto stunted fruit could stand. Under better conditions this fruit should improve.

SARDINIAN.—Ripe 15th November, small to medium, very pale skin, white flesh; quality very fair, ripened sound.

ROYAL.—Heavy crop, first picking 30th November; size not quite up to mark, being too early to benefit fully by rain; split a good deal when rain came, later fruit improved considerably in size. Yielded fifty cases off one row of twenty-eight trees.

OULLIN'S EARLY PEACH APRICOT.—Ripe 30th November, size good, flavour very good; a good cropper, but ripens a little too much on one side first, making it a trifle awkward for packing unless picked at a certain stage.

LUIZET.—Ripe middle December ; size medium, quality moderate.

ST. AMBROISE.—Ripe same as last ; size medium, quality splendid.

MANSFIELD'S SEEDLING.—Ripe Christmas, size good ; fruit solid and of good quality.

LARGE EARLY.—Ripe Christmas ; only a few fruit, quality good average.

ALSACE.—Ripe Christmas, a good cropper so far ; size, general quality, and flavour all good.

ANGOUMOIS HATIVE.—Ripe Christmas, good cropper ; fruit strong and bulky, and apparently a good packer ; quality good.

WARWICK.—Ripe Christmas, medium size, quality good ; fruit strong and firm.

ROYAL GEORGE.—Ripe Christmas, early ; a large, flat, and somewhat lopsided fruit ; very free on stone, and of delicious flavour.

CAMPBELLSFIELD SEEDLING.—Ripe Christmas, early ; a large, flat 'cot, free on stone ; a good dryer ; flavour very good indeed.

KAISHA.—Ripe Christmas, a few very large showy fruit ; strong and of good quality.

MOORPARK.—Ripe well before Christmas and up to New Year ; a fair crop, but would have been better in a good season ; nearly all great fruit of good quality, a pleasure to handle, and took well in market ; a lot of these were fancy-wrapped.

HEMSKERKE.—Same as Moorpark.

BLLENHEIM.—Ditto.

Our marketing was mainly in Royals, Moorparks, Blenheims, and Hemskerkes, as we have full rows of them. The others, with the exception of the Alsace, of which we have a row coming on, are all in pairs or two only of each variety, for the purpose of proving their suitability for the place and district and their general qualities. We have a few others, which have yet to come into fruit.

PEACHES.

A limited list of these has come into fruit this season, but in that list there is something which I consider of the highest value.

CHINA FLATS.—Experimental only ; ripe New Year ; moderate fruiting only ; fair size and quality for the sort, but I do not place a high value on these.

GOVERNOR GARLAND.—Ripe 1st December ; a beautiful peach ; medium size, but rare good quality.

ALEXANDER.—Ripe 4th December ; like last.

FOSTER.—Ripe early in January ; a great peach of high commercial value ; size splendid ; quality splendid ; a good packer.

LADY PALMERSTON.—Ripe early in January ; one of the very best ; size good ; quality really superb.

GLOBE.—Ripens on through January ; a vigorous grower ; good cropper ; size really extraordinary ; quality fine ; a great marketing peach.

MUIR.—Ripens same as above ; great peach ; finest drying peach in the world ; yellow outside, and in quality good ; also a good marketing fruit.

SHANGHAI.—Ripens about with the last, perhaps a little later ; great size ; good useful peach for either cooking or dessert ; quality good ; a good cropper.

ROBERT STEWART.—A seedling from the last peach apparently, evidently of the same type, ripens a little later, not quite so big, but a very pretty fruit of fine quality, and very good flavour ; prolific. Next season this list should be very much increased, and I hope then to bring under your notice other valuable varieties.

I need not enlarge, in this report, on the market value of the fruit in this list (peaches) beyond saying that, with such quality as we have had this year in Foster's, Lady Palmerston's, Globe's, Muir's, Shanghais, Robert Stewarts, Alexander's, and Governor Garlands, we can command a price at any time in the open market; and it means that if we can do this the fruit-grower can do so too. You, sir, have yourself seen a sample of more than one of these varieties, and can judge of their excellence. Further, I may say that wherever I have sent this fruit the same verdict has been passed on it—viz., that it is of the highest possible quality.

Good judges with experience of English as well as Australian-grown fruits have told me that they never saw anything better even in England. One difficulty in handling arose out of the size of the fruit. In this way: they proved to be too large for the depth of our cardboard boxes for crate packing, and it means that for next season's crop, a difference will have to be made in the cardboards to accommodate this grade of fruit. There is no doubt that they pack beautifully, and the enormous advantage gained by wrapping and packing as we have done can be at once seen by comparing, as I did, our own fruit after its journey with other fruit sent and packed in ordinary cases.

Every peach in our lot would open out fresh and firm, with no bruises; the others were often so much bruised as to be unfit for sale.

This means, in its turn, that our packing will command the highest price, while ordinary packed stuff may not sell at all.

PLUMS.

In this line we have some good things showing up. In spite of the bad season, size and quality have been very satisfactory in most cases. However, as only a comparative few have come into bearing this year I need not give more than a very brief reference.

BURBANKS.—Good, very prolific, marketed all right; a great packer, will carry anywhere.

OCTOBER PURPLE.—Moderate crop this year; size and quality fair.

RED AMERICAN or CHERRY PLUM.—Good crop, good size and quality for this variety.

EVANS' EARLY.—Small in consequence of dry weather; one of the first.

KELSEY.—Great crop, quality and size good.

WICKSON.—Splendid crop (we only have four trees); these trees were a sight, with fine quality, large plums; promises well.

SHIPPER.—Some very good fruit.

BLOOD.—Ditto.

WILD GOOSE.—Ditto.

NEWMAN.—Ditto.

ROBINSON.—Ditto; a great cropper.

ANGELINA BURDETT.—Coming into fruit, a very fine quality plum; only a few this year.

COE'S GOLDEN DROP.—Ditto.

FRUIT FLY EXPERIMENTS.

Last year, at Westbrook, we only had an odd fly or two; this year we have had, altogether, through the season, a good many. Next year we will probably have more, for the simple reason that no sufficient check is put on its increase by the numbers of people in the surrounding district who grow fruit, either for their own use or for sale.

We must, therefore, defend ourselves against the carelessness of the general run of growers; more especially the man who calls himself a farmer, and grows wheat, or milks cows, or keeps sheep for a living, but at the same

time keeps a small lot of fruit trees to bear their annual crop untended and unchecked, and breed their annual brood of fly at the same time. However, in self defence, and for the benefit of the growers as well, we have carried out experiments this season, to a certain extent only, with netting on the trees as a preventive for the fruit fly. Our experiments come short of what could be wished, for the simple reason that we had not a full crop of fruit on any of the trees covered, and on many of them very little.

My original purpose was to cover the tree, and, in the event of its proving a success, to report on (1st) the cost of the netting and any other material used, and (2nd) the value of the crop thus kept free from fly.

It would then be a simple matter to say whether it would pay or not.

Not having the full crop of fruit, I cannot give the exact information needed, but I can go a long way towards it.

I can state here that which I am very pleased to be able to state—viz., that the netting does keep the fly out, and so saves the fruit.

Out of quite a number of peaches which I covered, I failed to find a single maggotty fruit. The fruit under the nets was allowed to stop on the trees until some of it went rotten ripe, fell off into the net, and gradually dried up, but there was no sign of maggots or of the rot which always accompanies them.

First of all, fruit-growers should bear in mind the quality of the fruit we have already produced, and note that that quality will command the highest prices. Our sales this year show from 10d. to 1s. per dozen for these peaches; they should consider also the fact that it does not matter what quality or quantity of fruit they may grow if the fruit fly gets properly at it; they will go down in the market, supposing they get there at all. In other words, it means getting the best for a little outlay on the one hand, against getting nothing practically on the other.

Now, at Westbrook I covered, at a cost of 3s. 6d. to 4s., trees capable of bearing comfortably three cases of fruit, which is to-day worth 5s. per case. That gives 15s. less, say, 4s., or 11s. worth of fruit, which is quite satisfactory. Next season, if the crop is a full one, I hope to get at the exact value.

In the case of some of the plums I covered, I am satisfied it will pay, as 10 to 12 yards of netting cover a tree capable of bearing quite a case of fruit worth 2s. 6d. to 3s., the netting costing 10d. to 1s.

The beauty of this is that it enables a grower to guarantee his stuff, and you have none of the sickening loss which occurs where the fly gets a free hand. Nothing in the world could have been prettier or better than the peaches I gathered under the nets at Westbrook; and when I sent them away to one of our buyers, a wire came back asking for more.

Still, in carrying out these experiments I found the thing had its drawbacks, and that difficulties cropped up unexpectedly oftentimes. In some points I have changed from the original method followed, and, I think, effected some improvements which make the whole thing so much cheaper.

It was at first intended to try covering the trees by means of a light timber frame made from pine battens run down to small sizes, over which the net was to be stretched and tacked on.

The very first attempt over a decent-sized peach-tree convinced me that this process would just about cost double what one could afford, and I dropped it. The next step was to consider putting the nets over the trees without any other support. We did this without any difficulty so far as putting it on was concerned, but we were bothered next by details such as fastening and closing the nets. The material is in 6-foot widths, and it takes a little cutting to prevent too much waste.

I followed up the plan adopted in South Africa of fastening and closing the nets with safety-pins; I also tried joining two widths for larger trees by sewing together with a machine. I tried these first with a tape on each side to give a grip, and then successfully with only one tape. This answered very well so far as it went, but we still had the sides to fix with safety-pins. A little

exposure to wind seemed to unsettle the nets and make them gape between the pins, and foliage used to poke out here and there, although in pinning we double-folded the two edges together. As a little time went on we got more wind, often very strong, for at Westbrook it is nearly always blowing hard, and this had the effect of making the nets gape still more. We had to keep going round re-pinning and fixing, until I began to think it would not do, one wanted something better still. I got over the difficulty by using bagging twine and pack needles not only for repairs or refixing, but also for joining lengths together at first.

I used to stretch two double-widths together right along the veranda, draw them tight, and sew together with the twine in half hitches about 6 inches long. A man can get over this very fast. Then I rolled the stuff up, carried it out to the trees, and cut off as required.

After drawing the prepared piece of net over the middle of the tree it is generally easy to fix the sides by stitching down, and the beauty of the stitching is that it hardly gives a bit. The net is gathered at the bottom, and tied round the trunk. Although this netting is so thin and weak in appearance, it is wonderful what it has stood at Westbrook. Weather conditions have included everything from a gentle breeze to a violent gale, with rain and hail, and yet the nets have nearly all stood it out. A few of the first put on frayed out in the tops; one or two tore away a little, but nothing to speak of; and I reckon trees can be covered by the stitching process so that they will stand nearly anything. A more severe test will surely never be needed than what occurred at the Hermitage on 2nd January, when trees were uprooted and buildings blown away. Yet the nets I had put on the apple-trees stood the test, with the exception of two, and they did more, they saved the fruit underneath from the hail so that there was hardly a mark on it.

On the Downs one of the greatest troubles is putting on the nets, because you rarely get a time when the wind is not blowing strongly, and it makes the netting fly all over the place. In districts where calmer conditions prevail, trees could be covered at a rapid rate. On the Downs it is a slow process.

The nets have more or less of a rasping effect on any fruit which is on the outside of the tree, but I do not think the loss would be very serious from that cause.

Only in the case of our young apple-trees am I afraid of the fruit rubbing off, or damaging; and with them the trouble is that some hang on the ends of limbs, often two and three together, and when the heavy winds blow they simply get banged about, and there is no escape.

DATE PALM PLANTATIONS.

In his annual report the Conservator of Forests, South Australia, writes as follows in reference to the date palm plantations in the interior:—I am glad to report that the date palms in the far north continue to develop in a most satisfactory manner. Progress has been especially marked in the seedling plantation at Lake Hamy, as well as among the Algerian palms planted there. The seedlings are now from 3 feet to 5 feet high, and their general growth has been so uniform that a person working among them can only partly be seen. Many plants of either sex have also flowered. The Algerian palms have made great progress; some are quite 10 feet high. They have developed numerous suckers, and it is anticipated that some of these will soon be strong enough to transplant, and thus increase the existing number. Sufficient fruit was borne by one or two this year to show that a fine sample of superior quality may be ultimately expected when they get into full bearing. Unfortunately the only one remaining of the two received from Algeria, which were marked as being male palms, has now turned out to be a female, and it produced a few dates this season.

This is to be regretted, and had there been a male of exactly the same kind of date, the use of its blossoms as a means of fertilising the others would have rendered it highly probable that the fruit subsequently yielded by seedlings raised from the dates these palms produced would have shown little if any departure from the original excellent type of date. Fortunately, however, a parcel of fruit was obtained from Tunis last year through the courtesy of Professor Perkins, the dates from which are very similar in character to the "Deglet Nour" date from Algeria, and as seedlings are being raised from this seed the loss sustained will be somewhat modified. The palms at Hergott continue to thrive and dates have again been ripened there, this being the eighth season that this fruit has been produced in the north. The occurrence of light rains, however, during the ripening period rather affected the quality of the dates this year, as the unbroken continuance of a dry arid heat is indispensable to the thorough perfection of the dates; but, as this is a very exceptional experience at that time of the year it may be a long time ere it occurs again. A further effort has been made during the year to increase the number of seedlings in the experimental plot at Oodnadatta. On 27th November, 1899, 236 seeds, which were obtained from Tunis, as already indicated, were sown there by the foreman (Mr. N. W. Wilson), and most of them germinated, but only twenty-four were found to be living when he again visited the block on 30th April, 1900. This number, however, with those that were alive the preceding year, total thirty-six, and with a little more attention it is expected that the area will be stocked quite full enough.

As the train goes up from Hergott and back only once a fortnight, it will readily be understood that the intermittent nature of the rail service renders operations here very difficult, and necessitates leaving the plants to take their chance, as under present circumstances a resident officer cannot be maintained without incurring too heavy an expenditure. But while this retards the ultimate completion of the plantation it affords valuable evidence as to what may be expected when the seed are simply sown and left to themselves, which it was the object of the experiment to show.

The number of palms at Hergott and Lake Harry on 30th June, 1899, was 3,013. The total increase from seed at Hergott for the year ending 30th June, 1900, was 9; and at Oodnadatta, 36. The total alive at Hergott on 30th June last was 277; at Lake Harry, 2,475; and at Oodnadatta, 36.—*Adelaide Advertiser*.

Mr. Henry L. Pentecost, whose orchard at Helidon, near Toowoomba, is stocked with a variety of valuable fruit trees, has had much success with his date-trees. We here reproduce a bunch of dates from one of his trees, of which he says:—"I grew them from the seeds of dates purchased at a fruit shop in Toowoomba, in the state in which they are imported. I sowed the seeds some fifteen years ago, and, of course, I had no idea of the sex of the palms. My idea was merely to grow a few to get a 'glass of toddy,' such as I used to get at the toddy gardens, near Bombay, certainly not with any expectation of living to get any fruit. However, they are fruiting heavily, and, were it not for the fruit fly, they would pay me very well. On the tree depicted in the photograph, there are seven other bunches equally good, and two other trees are bearing quite as well, and there are numbers of young female seedlings growing up."

Mr. Pentecost sent a portion of the leaves of the male and female plants respectively, and the difference between the two is easily seen in the illustration, the male leaf being wider and stronger than the female. Mr. F. M. Bailey, to whom we submitted the fruit and leaves, hesitates to pronounce authoritatively on the fruit, there being so many varieties of *Phoenix dactylifera*, just as there are many varieties of apples and peaches. The bunch sent to us weighs something like 36 lb., and, although still unripe, the fruit looks very healthy. Our illustration shows the palm tree in bearing, and some of the fruit, natural size.



DATE PALMS AT HERGOTT SPRINGS, S.A.



1. DATE PALM AT HELIDON.

2. BUNCH OF DATES FROM ABOVE PALM.



DATES (NATURAL SIZE) GROWN BY H. L. PENTECOST, HELIDON.

THE DATE PALM FOR QUEENSLAND.*

By T. MORRIS MACKNIGHT, F.L.S.

[Read at a meeting of the Natural History Society of Queensland, on 1st November, 1894.]

The date palm is an example of extraordinary fruitfulness. Next to the cocoanut it is unquestionably the most interesting and useful of the palm tribe. Without it the desert would be uninhabitable. Do we not understand, then, the gratefulness of the Arab towards a tree which can derive its nourishment from the scorching sand, and scarcely less burning airs of heaven, and the brackish waters beneath the soil, which are fatal to all other kinds of vegetation; which retains its verdure fresh in the glare of a pitiless sun; which provides him with beams and coverings for his tent; cordage for the harness of his horses and mules; fruit to satisfy his hunger? What the vine is to the Italian, the cocoanut-tree to the Polynesian, the date palm is to the Arab. And more—far more. This single tree has peopled the desert. Without it the tribes of the Sahara would cease to be. The wealth of an oasis is competed by the number of its date-trees.

HABITAT.

The habitat of the date is North Africa, Arabia, Persia, Egypt, Nubia, Syria, and it does not go further east than the mouth of the Indus. It is indigenous in the Canary Isles; wanting in the south of Senegal, and it no longer appears in the Oasis of Darfur, between the 13th degree and 15th degree of latitude. The zone in which it grows well in general is that between 35 degrees and 19 degrees north. According to Link (*Die Urwelt*, I., p. 347), it flowers freely in the south of Europe, as in Sicily, the Morea, and the south of Spain; and also bears fruit there, though this is not sweet. In Sicily it still grows at 1,700 feet—namely, at Aderno and Trecastagne on Etna, but it probably does not bear fruit on this island (Philippi on Vegetation of Etna, "*Linnæa*," vol. 7, p. 731). It needs 5,100 degrees Fahr. of heat accumulated during eight months for the date to ripen its fruit perfectly. If the sum of the heat be less the fruits set, but they do not grow to their full dimensions; they also remain bitter to the taste, and lack much of the sugar and albumen, to which they owe their nutritive properties. The requisite conditions are realised in the Sahara. The mean temperature of the year there averages from 68 degrees to 76 degrees, according to the locality. The heat commences in April, and does not cease till October. Keith Johnston's "*Physical Atlas*" gives the temperature in summer and winter as—July, 81 degrees to 86 degrees; January, 52 degrees to 61 degrees; mean temperature (annual), 68 degrees to 76 degrees. Biskra, the celebrated date-growing district in North Africa, is in latitude 34 degrees 51 minutes, altitude 410 feet; it faces towards the hot tropical south, and is protected by mountains on the north side. It has an annual mean temperature of 68·5 degrees (January 50·2 degrees, July 89·8 degrees). The thermometer seldom sinks in the cold season more than 2 degrees below freezing point, and the date can endure 6 degrees of frost.

The neighbourhood of the sea is unfavourable to the production of good dates. The general altitude of the central districts of North Africa, where it thrives, is 600 feet to 2,000 feet; the date palm also grows in some Egyptian oases from sea-level to 600 feet. The lower portions of the Rivers Euphrates and Tigris in Turkey are from sea-level to 600 feet.

The amount of annual rainfall requisite for the best dates is from 5 inches to 10 inches; for those of inferior qualities, from 10 inches to 25 inches. Mr. A. S. White, secretary of the Royal Geographical Society of Scotland, gives, in his work, the "*Development of Africa*," 1890, a map of the rainfalls in North

* The author prefaced his paper with the statement that he made no pretence of having an expert knowledge of his subject. He had collected information from all the sources which were available to him, and had given the matter his consideration for some time past. The results of this compilation he submitted as a guide to those in search of summary information on the subject.

Africa, Arabia, and Persia, which may be profitably referred to in this connection. Although the date requires a hot, dry climate, yet its roots must have access to moisture. And though it is essentially a tree belonging to desert regions, yet it is confined to the oases in these deserts where water is found. It flourishes in rainless countries, but only where there is moisture in the soil, either naturally or produced by irrigation.

IRRIGATION AND OASES.

The "Oases of the Tableland," writes Charles Martins, in his "Du Spitzberg au Sahara," "are each watered by a stream or copious spring, and are but a short distance from the Mediterranean region. The oases of El Kantara is the first (Mangin) we met on leaving the Mediterranean region to penetrate to the Sahara through a ravine called the 'Mouth of the Desert.' It is 1,800 feet above sea-level, and its temperature just suffices to enable the dates to ripen. The oases of the Valleys of Erosion are watered by natural or artesian wells. An example is Ouargla, situated in a profound hollow. The palms are planted at the rate of 1,000 to 1,100 a hectare ($2\frac{1}{4}$ acres). Outside the gardens grow some wild date palms, which yield a smaller crop, but whose fruit is much more savoury. The oases of the Sandy Desert need water. The trees are here planted in conical cavities hollowed by the hand of man, that their roots may strike down to the subterranean reservoir which is to nourish them. These cavities are 18 feet, 25 feet, or 30 feet deep. The slopes around these hollow gardens are stayed indifferently well by a matting of palm-leaves. The wells are in the centre, and not deeper than 25 feet. These oases have a very precarious existence, as a gust of wind may bury them under an avalanche of sand. Every oasis is composed, in the main, of palms, which seem to form a continuous forest; but in reality they are planted in rows and in gardens separated from one another by walls of earth, which are pierced with an aperture to admit of the entrance of the irrigating rill into the enclosed square. The soil employed in the construction of the walls is removed from the paths, which are consequently below the surface, and can be employed for a double purpose: they facilitate circulation in the oasis, and the waters, after having refreshed the gardens, discharge themselves into these hollow ways."

SOIL.

Meyen, in his "Geography of Plants," page 2, states that a sandy soil suits the date best; and Sonnini, in his "Travels in Egypt," saw it growing in the sands as well as in the more fertile parts. It will luxuriate even in saltish soil, and the water for its irrigation may be slightly brackish. The artesian water of the Oued Rir district in Algeria contains from 0.57 oz. to 1.07 oz. of dry salt in a gallon. Brigade-surgeon Bonavia says that on the whole it thrives best in sandy, granitic, schistic, and calcareous soils. The northern half of Arabia, which is an important centre for date culture, is granitic.

INFLORESCENCE

The date is a diœcious tree, having the male flowers on one plant and the female or fruiting ones on another. The male flowers are considerably larger than the female, furnished with stamens only, and form a closed-up, folded, grape-like ball (previous to the ripening of the pollen) in an envelope called the spathe. "It blossoms," says Mr. Tristram, in his book "The Great Sahara," "in the month of March. The male flower is borne on a very short calyx, a thin petalous corolla much larger, with six stamens, furnished with long linear anthers, the two cells of which open themselves from within by two longitudinal slits. The female flowers present a double floral envelope, each whorl of which is formed of three pieces, constituting three distinct pistils, each surmounted by a stigma in the form of a hook. Of these three pistils one only develops itself, ripens, and becomes an elongated ovoid berry, with a slight epidermis of a yellowish-red, a solid and slightly viscous pulp, and an endocarp represented by a slight pellicle enveloping the nucleus, which is the seed. The seed is grooved,

and on the opposite side of it is a depression containing the germ." Baron Mueller states that one male tree is considered sufficient for fifty females. Watts allows one or two males to from eighty to two hundred trees.

PROPAGATION.

The best trees are produced from suckers from three to four years old, having an average weight of about 6 lb. Those raised from seed are much slower in maturing, and are generally poor. The sucker is taken from the foot of the stem of an adult tree; when first planted it must be watered daily for six weeks, and on alternate days for another six weeks, after which the trees are watered once a week in summer, and every month in winter. The nut does not commence to germinate until from six to twelve months after planting have elapsed, and grows very slowly for the first two years. The trees yield fruit in from five to six years, and are in full bearing at from twenty to twenty-five years, after which they continue fruitful for about 150 years. Several bunches of flowers are formed in a season, each producing often as many as 200 dates. Select trees are reported as having borne a crop worth £2, but the average may be put down at 4s. per tree annually, common kinds less than 1s. A good date tree is sometimes exchanged for a camel in North Africa.

FECUNDATION.

"In Algeria and all over the East," says M. Cossona, a botanist who has studied the subject on the spot, "towards the month of April the tree begins to flower, and then artificial fecundation is practised extensively. The male spathes are opened at the time when a sort of crackling is produced under the finger, which indicates that the pollon of the flowers in the cluster is sufficiently developed, yet has not escaped from the anthers; the cluster is then divided into portions, each containing seven or eight blooms. Having placed these pieces in the hood of his burnous, the workman climbs to the summit of the female tree, supporting himself by a loop of cord passed round his loins, and at the same time round the trunk of the tree, and, having split open the spathe with a knife, he slips in one of the fragments, which he interlaces with the branches of the female cluster, the fecundation of which is made certain." Archer says that wild plants are fecundated by bees. The Arabs even keep the pollen from one year to another in case the male flower should fail the succeeding season. According to Watts the pollen is said to remain active for one or two months after its removal from the tree, so the flower is carefully kept and used as occasion demands. Hasselquist, who travelled in Egypt, describes the operation as follows:—"When the spadix has female flowers that come out of its spathe, they search on a tree that has male flowers, which they know by experience, for the spadix has not yet burst out of its spathe. This they open, take out the spadix, and cut it lengthwise in several pieces, but take care not to hurt the flowers. A piece of this spadix, with male flowers, they put lengthwise between the small branches of the spadix which has female flowers, and then lay the leaf of a palm over the branches. In this situation I yet saw the greatest part of the spadices which bore their young fruit; but the male flowers which were put between were withered. The Arab also stated that unless they in this manner wed and fecundate the date-tree it bears no fruit; secondly, they always take the precaution to preserve some unopened spathe, with male flowers, from one year to another, to be applied for this purpose in case the male flowers should miscarry or suffer damage; thirdly, if they permit the spadix of the male flowers to burst or come out it becomes useless for fecundation; therefore, the person who cultivate date trees must be careful to hit the right time of assisting the fecundation, which is almost the only nicety in their cultivation."

To climb trees which have no branches but at the top, and the straight and slender stem of which cannot support a ladder, the Egyptians employ a sort of girth fastened to a rope that they pass round the tree. On this girth they seat themselves and rest their weight; then, with the assistance of their feet,

and holding the cord in both hands, they contrive to force the noose suddenly upwards so as to catch the rugged protuberances with which the stem is symmetrically studded, formed at the origin of the branch-like leaves that are annually cut. By means of these successive springs the top of the tree is reached, where, still sitting, they work at their ease, either in lopping off the leaves or gathering fruit, and afterwards descend in the same manner.

Professor Burnett says the age of bearing is from six to ten years. Haldane says seven years. Baron Mueller says that trees from suckers commence to bear in five years and are in full bearing in ten years.

The fig, pomegranate, and apricot, and sometimes the olive, are grown as auxiliary crops. I would suggest also the watermelon, pumpkin, vegetable marrow, and lucerne.

VARIETIES.

Dr. James Richardson in a letter in "Hooker's Journal of Botany," Vol. II., writing of the dates of Fezzan, describes forty-six varieties. Nineteen-twentieths of the inhabitants of Fezzan during nine months of the year live on dates. In Northern Arabia there are more than a hundred kind of dates, each of which is peculiar to a district, and has its own special virtues. Many varieties of dates exist, differing in shape, size, and colour of the fruit. Those of Gomera are large, and contain no seed. The Zadie variety produces the heaviest crop, averaging in full bearing trees 300 lb. to the tree. Professor Naudin states that the variety "Datheres-sifia" ripens its fruit early in the season. The "Deglet Nour" is considered the best for keeping.

TREATMENT OF FRUITS.

Four or five months after the operation of fecundation has been performed the dates begin to swell, and when they have attained nearly their full size (about the beginning of August) they are carefully tied to the base of the leaves to prevent them from being beaten and bruised by the wind. If meant to be preserved they are gathered a little before they are ripe, but when they are intended to be eaten fresh they are allowed to ripen perfectly, in which state they are very agreeable and refreshing. Ripe dates cannot be kept any length of time or conveyed to any great distance without fermenting and becoming acid, and therefore those which are intended for storing up, or for being carried to a distant market, are dried in the sun on mats. They are sent in this way to Europe from the Levant and Barbary. Each tree is capable of yielding only a certain number of good fruits, and on adult trees not more than twelve bunches are left to ripen. The whole cluster of fruit is cut before it is quite ripe, when it is put into a basket made for the purpose, having no other opening than a hole through which the branching extremity of the cluster projects. In this situation the dates ripen successively.

In the Hedjaz (which is the northern half of Arabia) the new fruit, called *ruteb*, comes in at the end of June and lasts two months. The people cannot therefore depend on the new fruit alone, but during the ten months of the year, when no ripe dates can be procured, principally subsist on date paste, called *adjoue*, which is prepared by pressing the fruit; when fully matured, into large baskets. "When the dates are allowed to remain on the tree till they are quite ripe, and have become soft and of a high red colour, they are formed into a hard solid paste or cake called *adjoue*. This is obtained by pressing the ripe dates forcibly into large baskets, each containing about 2 cwt. In this state," continues Burckhardt, "the Bedouins export the *adjoue*, and in the market it is cut out of the basket and sold by the lb. During the monsoon the ships from the Persian Gulf bring *adjoue* from Bussorah to Djidda for sale in small baskets weighing about 10 lb. each; this kind is preferred to every other."

The date seeds or kernels are soaked for two days in water, when they become softened, and are given to camels, cows, and sheep instead of barley. There are shops in Medina, in Arabia, where nothing else is sold except date

kernels, and the beggars are continually employed in all the main streets in picking up those that are thrown away.

The best fruit is that which is gathered just before it is ripe and is exposed to the sun for several days to mature. The crushed dates which arrive in England in bulk are inferior and damaged, having ripened on the trees and fallen. I have seen some beautiful dates in London on the stalks. These in the same way as raisins, have the short pedicels left on them. Then, again, I have seen in Port Said dates, prepared somewhat as we often see them in shops in Brisbane, sold very cheaply, being, I suppose, the refuse of the date groves pressed into a paste or soft mass. This is sold by weight in chunks. In Egypt, the dates of Upper Egypt and the Oases are those which are the most delicate. The hotter and drier the climate the richer is the date, and near the coast the poor fruit is fit only for animals, as mentioned in "French Colonies," by Bonwick, 1886.

MISCELLANEOUS.

Tunis has 2,000,000 date trees; Egypt, 4,000,000; Bussorah, in Turkey, has enormous date groves stretching along both banks of the Euphrates for a distance of over 140 miles, yielding 40,000 tons in good seasons.

The price in England in March, 1894, was—Bussorah (boxes) 9s. to 13s. 3d. per cwt.; Tafilet, 44s. to 50s. per cwt.

Dates contain more than half their weight in sugar, but there is a fair amount of flesh-forming material present as well. Dates, without the stone, contain in 100 parts—

Water ...	...	...	...	...	...	20·8
Albumen ...	...	...	...	...	...	6·6
Sugar ...	...	...	...	...	...	54
Pectose and gum	...	...	...	...	...	12·3
Fat ...	...	...	...	...	...	0·2
Cellulose ...	...	...	...	...	...	5·5
Mineral matter	...	...	...	...	...	1·6

The pungent rigidity of the foliage protects the date from encroachment of pasture animals; hence it can be left without fencing or hedging.

QUEENSLAND AS A DATE COUNTRY.

I have now given all the general information I can find in regard to the cultivation, &c., of the date palm in North Africa, Turkey in Asia, and Arabia. It will be convenient now to see if in Queensland similar conditions of temperature, &c., can be found. The part of Queensland which, bearing in mind the requirements of the plant already set forth, seems to be the most suitable for the cultivation of the *best* dates is to the west of Hughenden, Longreach, and Charleville, and from latitude 23 degrees to the southern border of the State. The following remarks all refer to this area:—

TEMPERATURE.

Comparing the region of Queensland which includes these places, with Biskra, in North Africa, in latitude 34 degrees 51 minutes at an altitude of 410 feet, we have—

	Queensland.	Biskra.
Annual average temperature ...	67·74	68·5
Mean temperature, coldest month ...	48·61	50·2
Mean temperature, hottest month ...	84·90	89·8

I do not know the extreme minimum temperature at Biskra, but the lowest in the part of Queensland above referred to is 26·4 degrees at Boulia in July, 1894. My information for Queensland is obtained from the Meteorological Reports, which are only available from 1st September, 1893, to 31st August, 1894.

I believe this last winter was considered a very cold one throughout the colony, and as the date palm can stand as low a temperature as 26 degrees it should be safe even at Boulia from being killed by frost. The latitude, 20 degrees S. to 29 degrees S., also indicates generally the area in which the suitable temperature is to be met with.

RAINFALL.—In the above possible date-growing belt of Queensland the rainfall ranges from 5 inches to 24 inches, and in the more westerly portion this reaches the minor limit, therefore improving the quality of the date on account of the greater dryness of the air combined with the circumstance that there is greater heat also.

ALTITUDE.—Looking generally at West Queensland, the rivers and creeks all run to the south-west, showing that the higher ground is to the north and east. Then there are high downs between the Gulf of Carpentaria waters and the Diamantina and Thomson Rivers; so that all this higher ground must vary from 600 feet to 1,400 feet above sea-level. But to the south-west of Boulia and Windorah and to the south of Thargomindah and Charleville the altitude of the country is from sea-level to 600 feet. From the above figures it can easily be seen where there is the least likelihood of frost.

SOIL.—The geological formation in the region indicated is mesozoic, with desert sandstone on the higher ground between the various watersheds, and lower cretaceous on the plains and downs. As apparently the date palm prefers a sandy soil, the conditions in this case seem favourable also.

From the above data it will be seen that West Queensland is generally suited to the cultivation of the best dates. As to the local conditions, they must be ascertained by Queenslanders themselves; the object of this paper is to give to the State the information in regard to the date which is scattered throughout many books and is not easily obtained, and also to suggest the best place for initiating experiments in date cultivation in this country.

[We are indebted to Mr. Hy. Tryon, Government Entomologist, for the foregoing paper.]

DESTRUCTION OF INSECT PESTS.

Those who have done some farming in the old country are well acquainted with the depredations caused there by the beetle called Cockchafer (*Melolontha vulgaris*). For three years it destroys crops from the roots under the form of a greedy white worm. Then, as a beetle or perfect insect, he harvests where he had not sown. Many means have been recommended to destroy it, but none perhaps is more efficient than the one devised and used for the last ten years by the French engineer, M. Dibos. His apparatus is very simple. It can be made of an ordinary washing-tub, to which is attached a sort of funnel made either of sheet iron or simply of linoleum from 4 to 5 feet broad. The tub is half filled with water. From the middle of the tub emerges a sort of iron stand, ending in a candlestick on which is fixed a resin torch. Towards the evening the apparatus is placed amongst the trees in the orchard or in the field, and the torch lighted. The beetles fly in thousands round the light, getting burnt or blinded, and they fall straight into the water or on the sides of the funnel whence they roll down to the water. Thus from 10,000 to 12,000 are caught in a week—if the season lasts about three weeks, that means 36,000 insects destroyed every year. M. Dibos reckons that half of them (18,000) are females, each of which would have produced 40 eggs. He has thus prevented the formation of 720,000 insects, each of which would have destroyed 3d. worth of crop during the season. As the torch cost him only 3d. or 4d. per season, one can see at a glance that it pays to catch the beetles. The device seems well worth trying against the enemies of the orchards and crops of Queensland.

MANGOES.

If mangoes are not yet the most extensively grown and abundant fruit in Queensland, they soon will be. They thrive vigorously from Southport to Cape York. Almost everyone having a garden goes in for mangoes, but too frequently are regardless of the quality of the fruit, and hence really good mangoes are rare. Some growers realise this, and take all the care they can to plant nothing but the best kinds. Had this been done from the first, Queensland would now be celebrated for her mangoes, and prices would be more satisfactory. As an evidence of the increasing appreciation of choice fruit by growers, a seedsman has during the last three years realised 2s. 6d. each for some fine specimens. I learnt with regret, at the market, that hundreds of cases had been thrown away this season for want of purchasers. Another, however, told me he had always been able to sell good mangoes. It has been recorded that in some places up North mangoes have been allowed to rot on the ground, the grower being unable to sell or use them. This should not be so, for there are many purposes for which mangoes may be used besides as a table fruit. The following information, in no case original, may prove interesting and useful to some of your readers:—A very delicious preserve is made by simply peeling them when unripe but nearly full grown; slice, place in a dish, pile on sugar, and bake in a slow oven. When properly prepared this preserve is unexcelled, and would meet with a large demand in Europe and America, as well as the Southern colonies. The making of mango jam is well-known to all housewives, its variation in excellence is doubtless owing to the quality of the fruit and sugar, also to the amount of care taken in cooking. The fruit should always be peeled. I am informed that young mangoes, about the size of olives make a pickle superior to walnuts; if this is so, nothing can be better. In India full grown but unripe fruit are partially cut through, the kernel removed, the cavity filled with chillies, ginger, and other condiments, then closed and put into vinegar. I do not know whether their yellow colour is impaired by mustard or turmeric. This pickle, which is excellent, is put up in jars of over 7 lb., and also in kegs. Mangoes make excellent sauce, equal to, and by many regarded as superior to, apple sauce. For making chutney mangoes are unrivalled. It is in this direction our pickle manufacturers should do a large trade, all the principal ingredients are produced in Queensland, and our market is secured to us by an import duty of 4s. per dozen quarts, 2s. per dozen pints, and smaller size in same proportion. After our own wants are supplied there should be considerable demand for passenger ships. In vessels of the British India and P. and O. I have noticed chutney on the table three times a day; probably this is so in other lines of steamers. Chutneys are made in infinite variety, various grades of hot, sweet, and intermediate. Some of the following recipes may prove useful:—

1st.—Chillies, 1 to $1\frac{1}{2}$ lb.; unripe mangoes, 1 lb.; red tamarinds, 2 lb.; sugar-candy, 1 lb.; fresh ginger root, $1\frac{1}{2}$ lb.; garlic, $\frac{1}{2}$ to $\frac{3}{4}$ lb.; sultana raisins, $1\frac{1}{2}$ lb.; fine salt, 1 lb.; distilled vinegar, 5 bottles.

2nd.—1 lb. salt, 1 lb. mustard seed, 1 lb. stoned raisins, 1 lb. brown sugar, $\frac{3}{4}$ lb. garlic, 6 oz. cayenne pepper, 4 lb. green mangoes, 2 quarts best vinegar—the mangoes (sliced) and boiled in a quart of the vinegar, the mustard seed gently dried and bruised, the sugar made into a syrup with a pint of the vinegar, the mangoes, sliced and boiled in a quart of the vinegar, the garlic to be well bruised in a mortar. When cold gradually mix the whole, and with the remaining vinegar thoroughly amalgamate them. To be tied down close. The longer it is kept the better it will become.

3rd.—2 lb. of unripe mangoes, peeled and boiled in a pint of vinegar (a strip or two of the skin may be included if flavour wished; 1 lb. onions, finely chopped. In another pint of vinegar boil 2 lb. sugar (not loaf sugar), 2 oz. ground ginger, and $\frac{1}{4}$ lb. salt; when cold mix thoroughly and add 2 oz. yellow mustard seed, $\frac{1}{2}$ oz. red pepper, $\frac{1}{2}$ lb. large raisins stoned, $\frac{1}{2}$ lb. dates, and $\frac{1}{2}$ lb. sultanas, all cut small; keep warm for a month.

4th.—3 lb. mangoes, 1 lb. onions, 1 lb. sugar, 1 bottle vinegar, pepper and salt and any spices to taste ; boil two hours.

5th.—Green mangoes, peeled and sliced, 4 lb. ; tamarinds, 1 lb. ; sugar (preserving), 1 lb. ; salt, 1 lb. ; cayenne pepper, 3 oz. ; or chillies (finely cut up), 1 lb. ; spices, 2 oz. ; vinegar, 3 pints ; mix the ingredients thoroughly, and boil slowly for a couple of hours.

6th.—50 mangoes, medium size, peeled and sliced ; $\frac{1}{2}$ lb. salt, 1 lb. preserved ginger, $\frac{1}{3}$ lb. garlic, $\frac{1}{4}$ lb. chillies, 1 lb. raisins, 3 lb. sugar, 1 quart vinegar. Make a syrup with the sugar and vinegar, in which the mango must be boiled ; when half done put in the others ingredients, mix well, and when thick remove from the fire. Time, one and a-half to two hours. Bottle when cold. I have not tasted any of those recipes, but some have been tried by friends who report favourably. Tastes differ considerably in chutney, some persons prefer sweet to hot, others the reverse, it may, consequently, be found desirable to vary the proportions of some of the ingredients.

7th.—12 lb. peeled mangoes, $1\frac{1}{2}$ lb. fine salt, $\frac{1}{4}$ lb. garlic, 3 lb. raisins, 2 lb. chillies, 3 lb. white sugar, 2 lb. green ginger, 7 bottles vinegar. The mangoes should be turning yellow, but not soft ; remove the stone. These quantities are weighed when everything is peeled, and all put through a sausage machine. Boil till a nice brown for about four hours.

8th.—5 lb. green mangoes (weigh with stones in), 2 lb. raisins, $\frac{1}{2}$ lb. mustard seed, $\frac{1}{2}$ oz. red chillies, 1 oz. garlic or onion, 2 lb. dates, $\frac{1}{2}$ lb. green ginger, $1\frac{1}{2}$ lb. sugar, 2 oz. salt, 3 pints vinegar. Peel the mangoes, slice half finely, put the rest through the mincer ; chop half raisins and dates, put the rest through the mincer ; ginger, garlic and chillies well pounded with a little vinegar. Boil all for an hour, and bottle while hot.

9th.—Peel 4 lb. green mangoes, remove the stones and cut them into quarters lengthwise, boil them slightly in a bottle of vinegar, and put it aside in a jar till cold. Take another bottle of vinegar, to which add 2 lb. sugar and boil till it becomes a thin syrup, put aside till cold. Take 1 oz. salt, 2 lb. picked and dried raisins, 1 oz. yellow mustard seed, 1 oz. garlic, 2 oz. dried chillies, 1 lb. green ginger sliced. Pound the garlic, chillies, and ginger finely in a mortar ; mix all the ingredients together, bottle and expose to the sun for three or four days, or place in a cool oven.

REMEDY FOR SORGHUM-POISONING.

Mr. John A. Edgar, writing from King's Creek, Clifton, says :—I am very sorry to hear of the losses in cattle through eating young sorghum, or Planter's Friend, and am also much surprised that no information has been forthcoming amongst our graziers and dairymen as to a remedy. For the good of my fellow-men whose stock has been dying from this cause, I will give you a remedy which scarcely ever fails, provided it is given aright and that the animals are not too far gone.

It is merely baking soda and common salt mixed in equal quantities with water. It is a very simple cure, but, having proved it, I speak of it with confidence. With respect to quantities I scarcely ever measure. Four or five tablespoonfuls of each to a gallon of water are sufficient to make a drench. One tablespoonful of salt and the same of soda are about sufficient for one cow.

Ensilage.—I have read with much interest Mr. Dowling's article on ensilage. The ensilage could be much improved by the addition of from $\frac{1}{2}$ to $\frac{3}{4}$ cwt. of salt to the ton of ensilage. Sprinkle the salt all through the stack in thin layers. Cattle will then thrive twice as well, especially if the farm soil is deficient in salt.

Viticulture.

AN EXPERIMENT IN VINE TOPPING.

By E. H. RAINFORD,
Instructor in Viticulture.

In former articles on summer pruning the writer has deprecated the practice of indiscriminate topping of the vine which many vignerons indulge in, maintaining that it is decidedly disadvantageous instead of beneficial, and that it should only be practised when cultural operations render it absolutely necessary.

With a view to getting some fact to support the argument, the writer this season made an experiment on some vines with the following result:—In the middle row of three rows of Mataro or Espar vines, at the Westbrook Experimental Farm, twenty vines were topped to about 12 inches length above the last bunch of grapes shortly after the berries had set and were the size of large shot. The topping was renewed twice when the laterals had made sufficient growth to allow it.

Result :—The bunches coloured at least a week later than those on the vines on either side, in some cases ten days later. When the grapes were picked, the grapes of the vines that had not been topped contained 20 per cent. of sugar, whilst those of the topped vines contained 16.5 per cent. of sugar; there was decidedly less colouring matter in the skins. Had the grapes of the topped vines been allowed to hang for some time longer, they might have gained a little in sugar, but not much.

Surely this goes some way towards proving that excessive topping is hurtful and not beneficial; but, as conclusions should never be drawn from a single experiment, the writer intends next season to continue the study on a larger scale with several varieties and topping to different heights.

[This experiment has been well borne out by a previous experiment on Isabella vines. The year before last an amateur gardener pruned off all the tops of his vines a foot or two above the fruit. There was a splendid show on the vines, but the result of pruning, so far from benefiting the grapes, proved a positive injury. This season he left the vines severely alone, and, as a consequence, the vines, which last season produced 3 cwt. of grapes irregularly ripened, yielded this season nearly double the quantity, and the grapes ripened well together.—Ed. Q.A.J.]

USEFUL CORN-SHELLER.

A new corn-sheller has been invented by Mr. C. D. Prindle, Newkirk, Oklahoma Territory, U.S.A. He has devised a machine embodying novel features of construction that adapt it to shell corn from the cob in a rapid and perfect manner; to screen, clean, and grade the grain; remove the cobs from the machine; and likewise convey the shelled and cleaned corn outside and away from it. The portability of the entire machine, attained by placing it on a wheeled frame, is of great advantage, and enables the owner to shell the corn, clean it, and put the cleaned and graded grain into bags out on the field during favourable weather, thus avoiding the unnecessary handling of the fodder and husked corn.

Botany.

WATER HYACINTH DESTROYER.

The great pest of our (Louisiana) small bayous and coulées, the water hyacinth, has taken such a firm and unyielding stand that drastic measures are now necessary for its eradication. Numerous attempts have been made to get rid of this rapidly spreading menace to navigation, but apparently in vain. Terrebonne parish in particular has waged a vigorous war against it, a special appropriation having been made to dredge out the many bayous there. The dredges, which are serving the double purpose of deepening the channel of the bayous as well as cleaning out the hyacinth, move but slowly, and, in consequence, stray bits of the plant float in behind the boat and multiply so quickly as to impede navigation, or stop it altogether, before the bayou has been entirely dredged.

Major Quinn, of the United States engineering corps, when stationed here, devised an arrangement, recently perfected by the Johnson Iron Works, which bids fair to be put into general operation for clearing our streams of the hyacinth, and destroying it at the same time. The machine proper has been placed on a flat-bottom boat of light draft, it consisting of an arrangement for drawing the hyacinth from the water, which is deposited on a carrier that feeds it into three rollers of the sugar-mill type. Each roller is 18 inches in diameter by 30 inches in length, and moves at a speed of 3·7 revolutions per minute. After passing through the mill the plant is burned, thus ensuring against the possibility of it ever reviving, for simple mutilation only multiplies its growth.

As the trial cruise of this boat is now going on, it being reported as working satisfactorily, in all probability the National and State Governments will order many duplicates of the machine, and then the extermination of the water hyacinth may be expected.—*Sugar Planters' Journal*.

TO CATCH A FOWL.

Mr. D. F. Laurie, South Australia, says:—To catch a fowl generally means a great disturbance, and often its plumage is damaged. A simple device obviates all this. A piece of No. 8 fencing wire is bent, so that a fowl's leg will fit easily in the crook; turn the other end into a small loop and fix to the wooden handle with a screw and a couple of staples. A catcher 8 feet long generally suffices. Proceed quietly, having first offered some grain or other inducement; stand behind the bird and jag him gently, and draw him towards you, moving your grip; he will come quietly, and rarely is there a flutter. No fuss and no damaged feathers. After a time it will be found that old stagers keep one eye on the "catcher" and skip out of an embarrassing position with much skill. Never carry poultry head hanging down; this does much harm to them; a fat bird may not recover the ill-effects, and they always flutter. Grip the legs firmly and place the bird on the left arm; there is room for as many as you can grip the legs of.

Horticulture

MUSTARD AND CRESS.

Do market gardeners realise that mustard and cress will pay them well for any little time and skill they may expend on the production of this delicate salad? It is almost always in season, and requires no special cultivation. The soil required is ordinary garden soil put through a sieve (about $\frac{1}{8}$ -inch mesh). This soil must be mixed with sand—3 parts earth to 1 part sand. Wet the soil; then sow the seed, but do not cover it; the seed will settle itself. Sow the cress in one bed and the mustard in another—never together, because the mustard will soon outgrow and choke the cress. Keep sowing every day, because germination and maturity follow close on one another. Mustard will be above ground in three days—cress much about the same; and only two days elapse between the cutting time of the two. But, if left longer, the coarser growth of the mustard will overshadow that of the cress. Water every morning and evening.

MECHANICAL HAND PLANTER.

All vegetable-growers know what backaching work is the planting out of large numbers of cabbages, onions, sweet potatoes, &c., and doubtless they would hail with pleasure any device which would enable them to carry out the work in comfort. The *Californian Fruit Grower* notices such a useful implement, and we gladly give the company bringing it out a free advertisement. The journal quoted says:—

With the Masters' rapid plant setter, the only hand mechanical device of the kind on the market, all plants, such as cabbage, tobacco, tomatoes, cauliflower, strawberries, sweet potatoes, sugar beets, &c., are set in water and covered with soil at one operation. The plant roots are put down to the proper depth. With it plants may be safely set out when large enough, regardless of the weather. Any man with a little practice can set out 7,000 to 10,000 plants each day. The Masters' planter will save its cost a dozen times over in one season, and every farmer, gardener, and truck-grower should have one. Full particulars may be obtained by addressing the Masters' Planter Company, 174 South Water street, Chicago.

GROWING BEANS IN DRY WEATHER.

During the hot dry weather of December and January, vegetable-growing is a very precarious business, and many amateurs will not even attempt the work. But that good vegetables have been growing all through the last hot season is evidenced by the fine lettuces occasionally brought into town for sale. The other day we were shown a sample of splendid French beans grown by Mr. F. C. Wills, of the Agricultural Department. They were grown in trenches instead of on the flat. The trenches were 12 to 15 inches deep on sloping ground to enable any excess of water to get away in the event of a heavy storm. Manure was placed in the bottom, covered with a little soil, in which the beans were planted. As they grew, the trenches were mulched, and the plants grew without any check and continued to bear heavily.

THE COTTAGE VEGETABLE GARDEN AS A PLEASURE AND PROFIT.

BY W. FRENCH.

The three essential points to be considered in forming a vegetable garden are—water, soil, and shelter. If vegetables are grown for sale, other things must be taken into account, such as convenience to rail, market, &c., but, as this paper only deals with the cottage garden, this need not be discussed.

Water must be placed first, as it plays a very important part in gardening of all descriptions, and especially in the vegetable or kitchen garden.

Soil comes next, and this cannot be too good for vegetables. If good soil is not available, the best thing to do is to add a liberal and judicious quantity of manure which will ensure the desired results. This, however, will entail a little more labour.

The third item—namely, shelter—must not be lost sight of, for when a garden is fully exposed to westerly winds, which, as it happens, are at their worst when our main vegetable crops are in full swing, sad havoc is played with all kinds of vegetation, as they seem to pierce every hole and corner, and affect old plants as well as young ones.

Trenching is a most important means of improving the soil. There are various methods of performing this work, which differ according to the soils to be worked.

Common trenching, which should be about 2 feet deep, is performed as follows:—

We will suppose the ground to have a gradual slope, in which case you will start trenching on the upper side of the ground, as it will be found a great deal easier, and, another thing, you will save yourself a backache which would be the result if you started at the lower end and worked up. Mark off a strip the length of your spade, which will be about 2 feet 6 inches wide; dig the whole of the earth out of the first portion to the full depth, and wheel it to the lower part of the ground where the work is to terminate. Suppose the soil is fairly good for 1 foot deep, and the next foot down is of a very stiff clay: my advice would be to leave the subsoil in the bottom after digging it well up. If a supply of coal ashes is available, mix plenty of it with the stiff soil, in order to keep it from settling again into its old form. If the soil is of a sandy or gravelly nature, the best way would be to turn the top spit into the bottom; the bottom soil will then, by being exposed to the atmosphere, be sweetened and greatly improved. Soil thus dug should be left in a rough state for at least one month.

Value of Manures for Vegetable Crops.—Manures from the cow, horse, pig, and sheep are among the ancient and most valuable, and are as a rule easily procured. For my part I prefer to mix the whole together, or, if not all, as many kinds as I could procure. Cow manure is cold and watery in character, while that of the horse is drier and more open in texture, and is therefore more liable to heat. Sheep manure comes next to horse manure for heating, and decomposes when heaped together. After studying the character of the different manures I think you will agree with me that by mixing them together, so that the coolness of one kind shall check the tendency to heat of the other, the best results will be obtained. A mistake is often made by heaping manure and allowing it to lie for a considerable time, especially when fully exposed to the sun and rain. What with the sun drying the good properties out and the rain washing the valuable organic matters away in the shape of what is called liquid manure (which, by the way, is the real essence of the compost), I believe fully 50 per cent. of the properties you have been so eager to obtain is lost.

Strong, clayey soils are about the worst we have to contend with for growing vegetables; and sand, ashes, and lime are the most useful for breaking up the stubborn tenacity of such. As I believe that the greater part of the soil about Brisbane is deficient in lime, you cannot go wrong in applying it in judicious manner, say 1 ton to the acre, which is a very weak dressing.

Crushed bones also make a good and lasting manure, say $\frac{1}{2}$ -ton to the acre, provided it is of a good standard. Nowadays, I believe the bonemeal has not the strength of that obtained in former years, on account of the bones being boiled far too much, with a view to extracting gelatine as well as fat.

There are also liquid manures, such as guano, 2 oz. of which is mixed with 1 gallon of water; liquid cow manure—namely, 1 part of manure to 8 parts of water in weight.

Seed Sowing.—Having got our ground in good tilth, we will now commence to sow our seed, say that of cabbage and cauliflower. (*Brassica oleracea*, the wild cabbage, is the parent of the many varieties now grown of this common vegetable, showing what can be done by means of cultivation.) St. John's Day Improved cabbage is one for early sowing, as it stands the heat better than any of the others. Sow broadcast in a well-prepared little bed. I prefer sowing from about August up to November, and let the plants stand until February, when they may be planted out. They will look crippled for a day or two, but after a while you will find them turn into well-shaped plants. Another advantage in this, and not a trifling one either, will be that the insects will not bother them on account of their hardiness. You will also have cabbage when other vegetables are very scarce and dear. Place the plants, say, 15 inches apart in rows 18 inches apart; give a good mulching, which will be found of great advantage in all weathers, especially in hot, dry weather, as it prevents evaporation. You will also find that the plants will not want half as much watering as they would if not mulched. For preparing a mulch, we use any old grass or rubbish—in fact, anything in the way of vegetation should be kept in a heap and allowed to rot down for this purpose. Flat Dutch, Early York, Drumhead, Enfield Market, Sugar-loaf, and Succession are good varieties of cabbage.

Carrot (*Daucus carota*) may be sown from February until August. I prefer to sow in drills rather than broadcast, as they are easier to keep clean. Allow 9 inches between the rows. Thin out when young, so that the plants left may be about 6 inches or less apart. If the ground is of a stiff heavy nature, the Short Horn variety will suit best. Other varieties are—Early Long Horn, Long Red, White Belgian, and Scarlet Intermediate.

Parsnip (*Peucedanum sativum*).—A good variety of this is one called "Hollow Crown."

Turnip (*Brassica rapa*).—Among the best sorts are White Stone and Red American.

Beet (*Beta vulgaris*).—Blood Red and Henderson's Short Top are both good kinds.

Kohl-rabi, a turnip-stemmed cabbage, is, I consider, a valuable vegetable, and prefer it to turnip. It is very easy to grow. The four last-mentioned require similar treatment to that given for the carrot.

Onion (*Allium cepa*).—February to September. If the ground is in good condition, I prefer to sow in rows where the plants are to grow permanently. Some prefer to sow in small seed beds, and to transplant when large enough. This mode is right enough should the weather be showery, but, if dry, there is a great risk. Allow 15 inches between the rows, and thin out the plants to 6 inches in the row. Eschalots may be propagated throughout the year by division of roots, and may be treated in a similar manner to the onion. This class of plant is a valuable addition to a garden, for you can pull at them and come again.

Celery (*Apium graveolens*).—February to June. Requires a good rich soil in a moist place. Sow in a box, and, when 3 or 4 inches high, prick out into a well-prepared bed, say, 6 inches apart until they are good strong plants. Next dig a trench 1 foot wide and 1 foot deep, placing the soil on both sides of the trench; then put in the bottom 3 inches deep of well-rotted manure. Mix this well with the soil at the bottom. You may then transplant your celery 6 inches apart and give a good soaking of water. When growing, a little liquid manure will be found beneficial.

Bleaching.—When the plants have grown about 1 foot high, draw the soil round them to within 6 inches of the top with one hand while carefully holding them with the other to prevent the soil getting into the heart. This operation will need repeating as the plants grow. When finished and ready for use, instead of a trench you will have a high ridge. Mammoth Red is one of the hardest kinds, while Crystal White is valued for its crispness and delicacy.

Leek (*Allium porrum*) requires about the same treatment as celery. Long Flag is a good variety to grow.

Broad Windsor Bean (*Faba vulgaris*).—March to June. Likes a good rich soil. Sow in drills 2 inches deep and 8 inches apart, in rows 3 feet apart. One pint will sow five rows, each 5 yards long. As the plants come into flower, pinch the top out. This will strengthen them and throw them into fruit. To prolong the succession of supply, the pods should be gathered as they are fit for use. Long Pod and Johnston's Wonderful are both good bearers.

Dwarf French Bean (*Phaseolus vulgaris*).—Sow 2 inches deep and 6 inches apart, in drills 2 feet apart. Draw the earth around the plants after they are well up, to prevent the wind blowing them over. Successional sowings may be made from September to March. If sown after March, the crop is apt to be a failure. Among the best varieties to grow are Canadian Wonder, Mohawk, Golden Wax, and Lima.

Pea (*Pisum sativum*) may be sown from March to August. With a good rich soil this is a vegetable that gives ample returns for your labour. The dwarf sorts may be sown in drills 2 feet apart. Do not sow too deep, say 2 inches. The tall varieties all require staking or supporting with strips of wire netting fixed on stakes, the latter being a neat and handy way. The base of the netting should be about 9 inches from the ground.

VEGETABLES USED AS SALADS.

Cucumber (*Cucumis sativus*).—August to December. Sow in well-prepared ground with a fair quantity of well-rotted manure, dug in. Allow 6 feet square to each set. Place three seeds into each hole, so that the weaker plants may be thinned out afterwards. Telegraph, Improved, Marquis of Lorne, and Sion House are three good sorts.

Water Cress (*Nasturtium officinale*) is an excellent salad. It is generally propagated by cuttings, but may be raised from seeds. A piece of ground a yard square I consider sufficient to supply an ordinary family the whole year round. Select a cool damp place, and you will have no difficulty in growing it.

Lettuce (*Lactuca sativa*) is a well-known favourite. Sow the seed in a bed prepared for the purpose, and when the plants are large enough, transplant into their permanent place, choosing showery weather for the operation. They do very well if planted between the cabbage rows, and are soon ready to cut. The cabbage-lettuce will be found to give satisfaction, and the Cos might be grown for variety.

Tomato (*Lycopersicum esculentum*) is an extremely wholesome vegetable, and can be grown all the year round with little trouble. When the plants are 6 inches high, thin out to about 3 feet apart, training them in a similar manner as that recommended for peas. To prevent them from rambling, nip out the end of the shoot when the first fruit forms. Don't forget to give a good supply of water. Some of the best sorts are Ignotum, Ponderosa, Mikado, Trophy, and Dwarf Champion.

It is very disappointing to find, after going to a great deal of trouble in preparing land and buying seeds and waiting some time, that there is no result for your labour, owing to having bought bad seed; therefore, I would advise you to keep to the well-tested varieties of vegetables, and obtain seed of them from our leading local seedsmen.

IN DEFENCE OF THE FORMAL GARDEN.

By C. C. DORNBUSCH.

There have never been more than two ways of laying out a garden, and these are the "formal" and the so-called "landscape" or "natural" style. The formal method was in vogue until about the middle of last century, and then at the time when it is generally agreed that art was on the decline in England it became the fashion to attempt artificial landscape in the neighbourhood of a house. As is always the case when there are two rival systems, strong arguments may be brought forward in favour of each, and, although the formal style is now beginning to assert itself once more, there is a tendency to utilise and combine the best points of each style. The ridiculous excesses to which each of these methods of gardening was in turn carried served to furnish with arguments their respective opponents. The upholders of the landscape system claim that all nature is a garden, and the principles which they profess to follow are perspective, light, and shade. Groups of trees are planted here and there to break a too extensive lawn; evergreens and wood are placed in opposition to the open ground. Deformities and unsightly objects are veiled with foliage, and where objects are wanting to animate the horizon they are supplied, such as, for instance, miniature temples, architectural seats, and imitations of ruins. It is claimed that in this way the living landscape is chastened or polished, and not transformed. Many notable artists have been identified with this style of gardening, and amongst them perhaps the best-remembered at the present day is Sir Joseph Paxton, the designer of the Crystal Palace. As against this system, it may be argued that the method of cutting out a sort of picturesqueness from the ground and planting trees to make what might be an artificial accident is a delusion—it is pretty sure to expose itself as a contrived thing. In a garden which is man's work, man's hand should be visible, showing some object in view. The garden should be designed with some apparent relation to the external shape of the house, and not as if the house had accidentally been placed in the midst of a wild woodland scene. It should be so planned that portions of the garden can be seen from the house. Different rooms in the house should command different views, and it should be specially provided that the whole of the views cannot be seen at once. The garden should be so arranged that it is quite as suggestive in what is not seen as in what is seen. This is a well-known principle in design, and applies especially to theatrical effect. A pleasing effect of this kind is obtained by an arrangement of hedge-bordered paths with constant turns where each turn confronts one with a new effect. Shady arbours and rustic seats may be conveniently distributed about. A square enclosure, with beds in geometrical patterns, and planted with rose trees, forms one of the prettiest sights imaginable. The even background of a clipped hedge sets off the forms of the other trees to perfection. From an artistic point of view, the straight line of the hedge is very desirable. Why is it that a picture is always greatly assisted by a margin and a frame? It is because the straight lines of the boundaries furnish the eye with a standard by which to measure and admire the graceful flowing curves within. The kitchen garden, the herb garden, the orchard, and the flower garden should all be in their own enclosures, and all connected together in one intelligent plan. The formal garden may be small, or it may be large, and the effect is always pleasing, but the landscape or natural garden must be large and costly. If the site is on a slope it adds greatly to the scope of the designer of the formal garden. The land may be terraced and a small sunk garden introduced. Statuary is a splendid embellishment to a garden, as is also our old friend the sun-dial on a stone pedestal in the centre of a square plot of green grass surrounded with neat gravelled paths, and outside of that flower beds luxuriating in a profusion of old-fashioned flowers, and the whole enclosed with a neatly trimmed hedge. The different levels may be approached either with slopes or steps, and the latter in

stone have a very pleasing appearance, but they unfortunately are dangerous to children. There is one garden in England where this difficulty was overcome by having the different levels connected by slopes until the children of the house arrived at ages of discretion, when stone steps were substituted.

In the age of Cicero, a formal kind of gardening prevailed characterised by clipped hedges and long avenues of trees. From the establishment of the papal government to the commencement of the thirteenth century, the monks were the only persons who attended to ornamental gardening. After that period, the style prevalent throughout Europe consisted in tall hedges, square parterres, straight walks, and rows of trees uniformly placed and pruned. A decided impulse to gardening followed on the dissolution of the monasteries by Henry VIII. In the time of Elizabeth a house was approached through an avenue and one or more courts. The house itself was a stately mass of buildings—two wings and a centre piece—with broad retreating shadows between. The walls on either hand would be festooned with a wealth of climbing roses, and these would be enlivened with splashes of sunlight and colour from the garden courts beyond. At the back, the brewhouse, offices, and so forth would be screened off from garden courts and orchards by walls of ample height. If there is one thing that is more characteristic than another of the gardens of the past, it was this system of enclosure and subdivision, and when that was abandoned the main charm of the old English garden vanished. The following is a description of one of these gardens:—"It lay on the hillside, by an old house in Yorkshire. In the first court, as you entered from the shrubbery, were beds of brilliant flowers cut out in patterns like a ceiling in the house, and against the south wall were vineries of Black Hamburgs and dark mysterious potting-sheds. Then there was the bowling-green—a wide expanse of velvet turf, with banks and terraced walks all trim and neat, where apricots and nectarines ripened on the walls. And one side was fringed with scarlet lychnis and sweet williams, where the red admirals and tortoise-shells would spread their wings in the sun all day. Then there was the summer-house, with a racing fox for a vane, and bowls in a corner cupboard; an apple-house, and last, but not least, an arbour. But an evil day came, when the quiet retirement of this unoffending paradise was invaded by the 'landscape gardener.' The walls were thrown down, the terraces destroyed, and the whole converted into a wilderness of specimen shrubs, for this was the new ideal that had taken the place of the old."

As I have before mentioned, old gardens were divided into several departments, and each of these bore a character distinctly its own. There was the parterre, or flower garden, with its fountains and flower beds in geometrical designs with box edgings. The bowling-green was there, too, with its garden-house and shaded seats, and also the fruit orchards and so forth. There was always a charm in length of vista. To give point to the long perspectives that were planned to pass through the grounds, they were adorned at intervals with fountains, statues, and other objects of interest. Each of these would form the centre of a network of cross vistas, so that sunlight or shadow, front view or profile, should offer the scene afresh as often as it was approached from a different direction. It was evidently from a wish to obtain a background of even tone and colour that hedges came to be trimmed. This trimming, or pleaching as it was called, and which is reasonable enough on these grounds, was eventually carried to absurd lengths. Single trees in a hedge were allowed to grow above the level of their neighbours, and cut into fantastic shapes, such as cubes, obelisks, peacocks, bears, &c., until at last the repose of the scene was quite spoilt.

There is no doubt that this was the cause of the change in fashion during the eighteenth century, when many beautiful avenues were cut down because straight lines were unnatural, and the gardens were converted into an artificial

wilderness. Clumps of trees were planted irregularly about, and paths were made to wind round them, and this has prompted someone to ask whether "the walks were curved in order to get round the bushes, or were the bushes planted for the walks to curve round?"

There are some notable formal gardens now in existence, and of such Hampton Court is an ideal one. Versailles, too, is a celebrated garden, but its immensity spoils it. The French king, under whose orders it was laid out, was too desirous of making an immense display. There is no standpoint from which anyone can grasp the huge scheme.

So that we see that, as the formal garden can be spoilt by excesses and extremes, so also can the landscape garden, the latter by the use of artificial ruined castles in miniature and ruined fountains overgrown with vegetation.

Formal gardens are seen at their best in floods of sunlight, and surely that is a condition with which we are well acquainted here in Queensland. An exact reproduction of an old English garden here would not be possible, nor would it be desirable; and no two gardens, even in the same locality, should be planned alike, for there are always accidental features which require different arrangement of the parts, and it is a matter for regret that streams of cool water with even, green, and sloping banks, and fountains would of necessity be absent from most Queensland gardens. But there are many ways in which the best features of the formal garden can be utilised and adapted to the different circumstances imposed on us by the climate. In the first place, the yew, which is the favourite hedge, would not, I think, do well here, but there are plenty to take its place. Firstly, I should name the African box thorn as the best hedge for our climate. It is a quickly growing evergreen, very dense in its growth, and if kept properly pruned will make a most perfect hedge. The next, speaking from my own experience, is the Osage orange. This has the disadvantage of being a deciduous tree, but its bright green foliage is very welcome in spring time, and its fruit adds considerably to its appearance. Following on this is the phillyrea. This hedge can be seen growing in the southern square along Fitzroy street, Warwick, and seems to be making remarkably good growth. The privet and the hawthorn can be seen growing successfully in our public squares, and I have been most successful with the blackberry. The blackberry requires staking to keep it up, and it is a mistake to do too much pruning with it. My practice is to carefully lift up the young shoots with gloved hands, and lay them along the top of the hedge parallel with its length. The pittosporum does well here. There are some single plants in the southern square, and Anderson's Catalogue says that it makes a fine evergreen hedge. The broom or furze also grows well as single plants in Warwick, and would, I have no doubt, make a good hedge. There are also many plants indigenous to Australia which are capable of cultivation as hedges, such as the old man saltbush. I have planted out a hedge of saltbush this winter, and, from my experience of it as a single plant, consider that it will make an admirable hedge. I have one specimen about 9 feet high, very compact in growth, and its beautiful whitish-green colour renders it very ornamental. A well-trimmed hedge of saltbush with a row of bright scarlet geraniums in blossom in the foreground would make a colour scheme unsurpassed in splendour.

For the making of arbours and covering trellis work there are many climbing plants which grow to perfection in this climate. For the quickest growers and most satisfactory plants to deal with for the purpose, we have the choice of the Japanese honeysuckle, white and yellow Banksia, and Fortune's yellow rose—all evergreens. There are also many others, of which may be mentioned the English honeysuckle, passion fruit vine, Virginia creeper, Cape jasmine, Madagascar bean, and *Clematis Jackmani*, together with numerous climbing roses. My experience of the scarlet rambler is that it is too straggling, but makes a pretty show when in blossom. The various seed catalogues enumerate a great variety of climbers, but one cannot always depend upon their success

in Warwick. For instance, Yate's Catalogue for 1900 speaks in very high terms of the *Solanum Seaforthianum*. Now, I grew this climber last summer, and it made rapid growth, and presented a very fine appearance when in flower, being like a violet belladonna; but I found that the frost, when it came, cut the plant down. For edging to garden beds we have the box, oxalis, pyrethrum, thyme, and white and blue violet—all of which grow well in Warwick.

Our flower beds can be stocked with a great variety of roses. It is only necessary to walk through our northern and southern squares to become aware of how kindly most of the roses take to this district. The moss rose is the only one that does not flourish here, and even that will do well in a moist and shady situation; and then what a wealth of colour we can get out of the old-fashioned English flowers. The wall flower, carnation, alyssum, snapdragon, balsam, cornflower, cockscomb, morning glory, daisy, pink, ischscholtzia, forget-me-not, gladiolus, geranium, sunflower, sweet pea, hollyhock, larkspur, lupin, linum, marigold, mignonette, nasturtium, pansy, pentstemon, phlox, stock—all these old friends can be cultivated here with the greatest ease; and there can be nothing more pleasing than the bright colours and sweet perfumes of these flowers arranged in wild and gay profusion within neatly kept borders and straight paths. Besides these flowers, there are others which would add to the brightness of the scene, such as the glory pea, canna, coreopsis, cosmos, hunnemannia, and various cacti, which latter could be arranged in rockeries at the intersection of paths in place of the more expensive fountain or statue. I have grown this year a wall flower, the seed of which I obtained from Mr. Searle, of Toowoomba, and which has been a mass of blooms for many weeks. It is called "Searle's Everblooming," and is equal to any of the wall flowers I have seen in England. The old-fashioned herb garden is very much neglected here. In the olden times every housekeeper used to have a stock of dried herbs on hand with which to season dishes and to make decoctions for physicking the members of the household.

It is to be hoped that as the country gets more settled we shall take more interest in the most fascinating and satisfying of all pastimes—the cultivation and beautifying of the gardens round our places of abode. One important result of the cultivation of flowers is the training which the eye receives in the matter of colour. By endeavouring to arrange schemes of colour, the eye becomes educated, so that it can detect the most subtle gradations. In this Nature is the best teacher. Next to sketching in colour from Nature, the arranging of flowers is of most value in this respect. Many people seem to have a natural aptitude for grouping colours in pleasing harmonies and contrasts, but there are many who are woefully deficient in this sense. The Anglo-Saxon race on the whole has not the love for colour that characterises the Latin races; and if ladies were to take a greater interest in arranging masses of colour in the flower garden, the result would manifest itself in the tastefulness in which they chose the colours of their dresses. It is simply a matter of educating the eye. Bright colours are not necessarily glaring if they are only arranged with discrimination. The Moors, the Indians, and the Persians employ colours with a grace and harmony never equalled by European productions. The appreciation of bright colours belongs to the normal healthy eye, and under our brilliant Australian skies we should develop the taste and admiration for bright hues so characteristic of the Italians.

Perfume Farm in Western Australia.

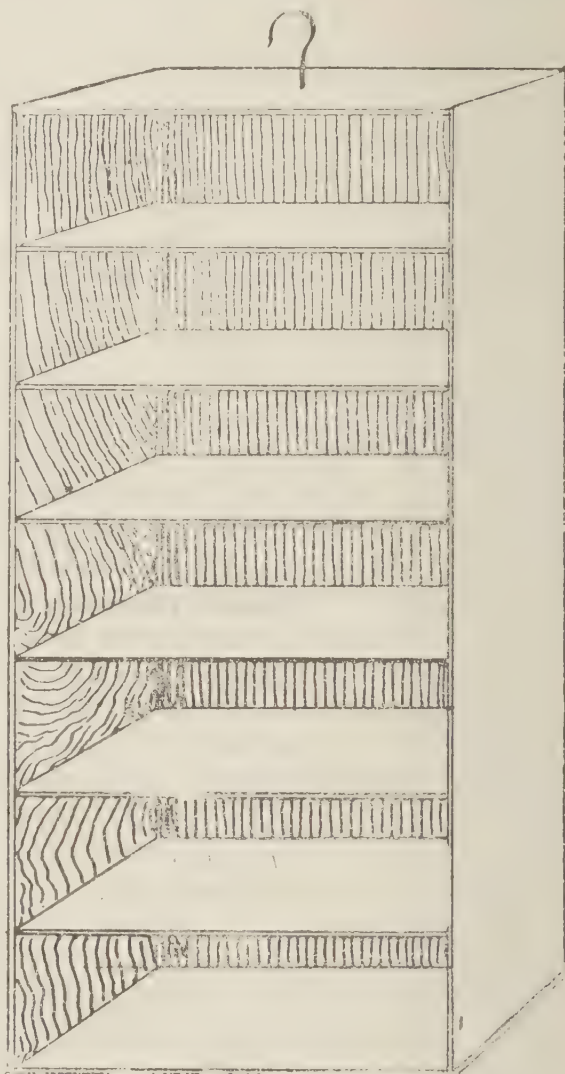
Whilst the idea of manufacturing perfumes either from the native blossoms or from imported plants has been for several years before the rural public of Queensland, no one, we believe, except the late Mr. L. Carmichael, a once well-known chemist in Brisbane, has ever attempted to establish a perfume factory in the State. Under the headings "An Industry to Be" and "Scent Farms" (in Vol. I., pp. 413 and 483, of this *Journal*), we drew attention to what was being done in this direction in Western Australia, Victoria, and Queensland. Later on (Vols. II. and III.) we printed several valuable papers on the subject: "Notes on Scent-yielding Plants" by a well-known Brisbane gentleman, who concealed his identity under the *nom-de-plume* of "Nat. Sine"; and generally we have described at one time or another the various processes of extracting the scent from flowers, including the distilling process. Nothing has, however, come of these articles. Corn and potatoes, wheat and sugar growing, afford no time for any new industry, no matter how promising. How valuable some essential oils are may be gathered from the fact that weight for weight the essential oil of roses is worth nearly as much per ounce as gold, and finds of all botanical growths the readiest market; 300 lb. of roses will yield 1 oz. of attar or oil, besides a quantity of fragrant saleable rose-water. One acre of land will yield 1,500 lb. of rose petals, and this will give 5 oz. of attar worth £1 17s. to £2 15s. per oz., and there will be some 300 gallons of rose-water valued at from 3s. to 4s. per gallon. Lavender will give a net profit of £20 per acre. Pure lard saturated with the scent of flowers is worth from £1 5s. to £1 10s. per lb. in London or Paris, and, if the fat is cut up and digested in spirits of wine (60 over proof) and 2 lb. of fat to 2½ lb. of spirit, this scent-laden spirit is worth 3s. 6d. per oz. or £3 10s. per pint.

Throughout Victoria increasing numbers of persons are turning their attention to the production of flowers for scent-making. The flowers most favoured are lavender, vera, tuberose, rose geranium, peppermint, lemon, thyme, violets, &c.

In Western Australia the industry has commenced in earnest. Last November (we learn from the *Journal of the Department of Agriculture* of that State) a large party drove out from Bunbury to visit the new perfume farm and factory of Mr. Kirton, on the Collie River. On the arrival of the party, which included most of the Parliamentary representatives and the ladies who visited Bunbury during the agricultural show, Mr. Kirton explained the objects of his industry. He had established this plant, he said, for the purpose of utilising the various shrubs which grew in Western Australia, in order to obtain their essential oils, as he was persuaded that the climate was especially favourable for the growth of the plants and the secretion of the oils. He was at present working on the wild verbena, but intended to deal with lavender on a large scale. He had now several acres of lavender planted, but would not be satisfied until he had planted 20 or 30 acres. Sir John Forrest, in declaring the factory open, drew attention to the value of the essential oils in the eucalyptus, sandalwood, and peppermint, especially dwelling upon the value of the oil extracted from the last-named. After complimenting Mr. Kirton on his enterprise, and wishing him success, the Premier declared the factory open. In the course of a later conversation, Mr. Kirton pointed out that the price of the oil obtained from the peppermint was only a little more than one-third of that obtained from the *Eucalyptus globulus*, the oil not being considered by the British Pharmacopœia of much value.

Some months ago we ourselves experimented with the blossoms of the *Plumeria*, or Frangipanni, and successfully extracted the scent from some thousands of blooms. The method was this: A box, as shown in the illustration, was provided with six shelves of common glass, the front closed by a glass slide. These shelves were coated to a depth of half-an-inch on both sides with absolutely pure fat, prepared by rendering down and refining beef suet, mutton suet, and lard. Every morning the spaces between the shelves were filled with fresh flowers, the old ones being removed. This work, which took very little time, was continued for about six weeks. At the end of that time the fat was removed and taken to an analytical chemist in Brisbane, who digested it (about 4 lb. weight) with 60 o.p. spirits of wine, and thus extracted the whole of the perfume. The spirit was redolent of it. This spirit could have been easily sold for £3 or £4, but, as we wished to make a complete experiment, the chemist tried to distil it, but he failed to separate the scent from the spirit, stating frankly that he had no experience in this particular class of work. Still, he did enough to prove that a large quantity of scent was contained in it.

We shall be happy to lend the box to anyone wishing to make the experiment, and to furnish full instructions for the work.



SCENT-COLLECTING BOX.

Forestry.

THE VALUE OF CEDAR.

Mr. J. Hopkins, writing from the Barron River (N.Q.), informs us that a timber-getter in that district lately felled a cedar-tree on the property of the Carrington Saw-mill Company which took a whole day to fell. On measuring up this forest giant, it was found to contain 14,000 feet of timber. The price obtained for it, including getting, cutting into lengths, and clearing the road through the scrub for hauling, was 10d. per 100 feet. Such a price seems to us to be an utterly inadequate value for a species of timber which is rapidly vanishing from our Queensland scrubs. However, when our Forestry Department gets into working order, we shall no doubt find that, with the restrictions on felling which we hope to see imposed, timber-getters will receive a fair price for such timber as that under notice.



COFFEE PICKING—CORRECT AND INCORRECT METHODS.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND—No. 6.

PICKING.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

In the last article of this series, I wrote, by special request, on "Pulping and Curing"; this article, also by special request, is therefore out of its natural order, which should have been immediately before Article No. 4.

The age of coffee is generally reckoned from the time of planting out in the field, for a plant may be anything from a six-month-old seedling to a three-year-old stump, as will be seen on reference to my chapter on "Nurseries" (No. 2, published 1st February, 1900, *Queensland Agricultural Journal*, Vol. VI., p. 120); and, though a few months may be gained with a well-grown stump plant at times, a tree does not really begin its business in life until it is planted out in the field where it is to remain.

Coffee takes three years to bear its maiden crop as a rule, and with bad cultivation or neglect (*vide* "Root Growth of Coffee Plants," *Queensland Agricultural Journal*, 1st November, 1900, Vol. VII., p. 214) it may take longer. In this country, however, coffee is somewhat more precocious, and the maiden crop is frequently obtained in less than the usual three years. The climate not being so dry, and the soil richer and more retentive than in most countries where coffee is grown as a staple, the showers about the time of blossoming (come to be known as "blossoming showers") are not such an inexorable necessity in this country. The moisture in the soil is, in most cases here, sufficient to ensure the opening and setting of the blossom even if no rain has fallen for some little time. This results in an absence of the loss, so frequently occasioned in other countries, by the burning of the blossom and failure of a portion of each blossoming to fructify or "set," thus ensuring not only a regular crop but a much larger one in proportion to the amount of blossom. Plants put out in January in North Queensland will frequently blossom in December of the next year or the following January, and ripen a small crop in July or August—that is, in from two years and six months to two years and eight months from the time of planting. In well-situated localities I have known coffee to bear after late planting when two years old, but such early bearing is always a strain on the trees and very dangerous. Any tendency to bear at so early an age should be discouraged, and here in Queensland, even in the third year, it is advisable to disbud from the green wood (see article on "Disbudding Young Coffee").

About December or January, the time varying a month or more in different localities, the coffee-tree will give indications of blossoming again. In the axils of the leaves or the eyes of the branches, from the youngest piece of new wood to the old stem, small buds will make their appearance. At first only the minute leaves or bracts (?) will be seen enveloping the bud proper and attached to it by a coating of wax that will always be found to cover the buds of the coffee plant. This wax appears at first as a light-yellow or brown ball at the end of the bud, and its use is to protect the delicate young bud from heat or cold; in hot weather the wax forms a thin coating over the bud and saves it from being burnt by the heat of the sun, and in cold weather cakes quite hard and saves it from the effect of a sudden dropping of the temperature—in either case, of course, only within limits.

So far the buds of leaf or wood and of blossom are indistinguishable, but as it grows the white of the blossom bud soon becomes evident, and about this time it will split and disclose from three to five (usually four) distinct blossom-buds;

occasionally the bud will be found thick and double, and will early disclose three or four sets of four buds each. As it continues to grow, it stands out like small thorns in all directions, and the blossoms will individually grow to a length of from a-half to 1 inch before opening, earning for themselves the technical term of "spike." This spike will, in dry countries, when nearly full size, stand for several days and sometimes weeks, but will not open without rain. After rain it opens promptly in from eight to ten days, according to the amount of fall; in this country, however, for the reasons already given, it will frequently open and set without waiting for the showers, and herein lies one of the secrets of the heavy crops that Queensland can produce per acre and per tree as compared to the other countries.

The sight of a coffee estate in blossom, especially when well kept, is one that needs an artist to describe, and once seen is never forgotten. The small, white, star-like blossoms quite lose their individuality in the immensity of the whole, and no prettier sight can be imagined than the ropes of perfect white, entirely hiding the brown wood, set off by the gorgeous dark-green leaves of the coffee. Blossom has scarcely ever been known to open in the day time; a little patch here and there, especially under shade, may do so, but it generally opens between 2 and 5 o'clock in the morning, or just before or at day-break. The sight of a whole field in blossom is one, therefore, that breaks on one almost as a surprise first thing in the morning, and the scent, which, though scarcely discernible in any one little blossom, becomes a delicate fragrance in the air, appreciable at great distances and too strong in the field to be pleasant.

The size of the individual blossoms will be found to vary considerably, and it was at one time thought that the size of the bean varied accordingly; but this has been proved a fallacy, as the small blossoms have been shown to produce as large a bean and berry as the larger ones. The scent will vary, too, being much stronger some seasons than others. This has not been accounted for yet, but the strength of the scent has a very marked effect on the setting of the blossom by attracting insects, butterflies, bees, flies, &c., which can, of course, detect it further off than human beings, and flock to the scene in numbers. Although coffee is hermaphrodite and able to fertilise itself, these insects materially assist in the process. Frequent infertilisation tends to deterioration of the sample, and is not so effective or general. A good strong scent, therefore, and consequent presence of the insects, will make a very marked difference in the output.

The blossom will begin to fade in twelve hours or so, but a good blossoming will last—that is, will continue to open more spike each day—for three days or so. While the blossom is open, all work in the field must be stopped, for not only are the insects interrupted in their work, but the blossom itself, being very delicate, is easily knocked or rubbed off. The short time while the blossom is open is, perhaps, the most anxious time for the grower. An untimely shower of rain means a great loss by damping the pollen and hindering fertilisation, or even knocking off the blossom altogether; and strong wind may shake the blossom off before it has time to set.

In very dry weather the blossom is not so large as a rule, but a dry month or two before blossoming generally means a good setting. Ideal weather, while the blossom is open, would be a bright sunshiny morning after a shower of rain the evening before, with a gentle breeze.

As a rule, in coffee, there are from two to four blossomings about ten days or a fortnight apart. In Queensland there are generally more. This is unnatural, however, and it is the grower's object to reduce the number of blossomings in favour of heavier ones, which can be done to a great extent by handling and pruning.

As the blossom sets, the petals will, as a rule, fall away from the calyx and hang on to the end of the pistil; when this is frequent and regular, it is generally considered a sign of good setting. Another method of judging is to turn the branch up and look at the underside of the very young berries three

days or so after the blossom has faded; those that have not set will appear yellowish, while the properly fertilised ones will be a healthy and bright-green colour.

After this, the young berries swell gradually and take some seven to nine months to ripen; the most dangerous stage of their life being when about the size of peppercorns, when very dry weather, or any accident to the roots, may cause them to wither and fall.

The berry should grow steadily until of full size, when the kernel will "set" or change from a milky soft matter to a hard bluish seed; after this the pulp or fruit of the berry will ripen, turning from a bright green to yellowish, and then red. Occasionally, berries will turn from green to red with hardly any appreciable period of yellow, but those that ripen unevenly, or ripen at the tip, will generally be found to be "light," or have imperfectly formed beans. When quite ripe, the coffee berry is about the size and shape of a cherry, and not unlike one in colour also, so much so that the term "cherry" has been taken into general use as denoting the berry at this stage of its growth.

When to Pick.—To wait until the berry is a perfect and bright red all over, or what is known as "dead ripe," is quite unnecessary. It might seem the only common-sense way of picking fruit, and certainly applies to large fruit, but in coffee it is not so. Coffee culture may, in a general way, be classed as a species of fruit culture, but it has this great difference, that in cultivation to produce this fruit, the seed only is required. It is also a fact that, just so soon as and no sooner than the seed is fully formed and full-grown, the fruit round the seed begins to ripen, and by this time it will be possible to separate it by squeezing. Bearing in mind that the fruit part, or pulp, is the part we throw away, and that the seed will not grow any more once the berry ceases to be green, it is obvious that the time to pick is when the berry has begun to change colour, and the seed can be easily squeezed out from the pulp between the finger and thumb. If picked green, no amount of pressure will separate the seed, and if put through a pulping machine in this state, some of the green pulp will either be chopped off, or the berry be cut in two, such cut beans subsequently turning green, or copper-coloured, from their contact with the metal of the machine, and discolouring and spoiling other beans in the sample. Green berries must, therefore, be avoided. In picking in the field some attention must be given to this matter, but it will be found impossible to avoid a few green berries; some will fall in by accident and must go through, but carelessness in this respect will often account for a large amount of loss.

On the other hand, over-ripeness must be avoided also; it will often take only a few hours of sunshine to turn a dead-ripe cherry to an over-ripe one. Coffee will never naturally be a *purple* red; if it is so, it has become over-ripe—that is, fermentation has set in under the outer skin. This has the effect of discolouring the parchment and spoiling the appearance of the sample, and if allowed to go on too long will also discolour and spoil the flavour of the bean through the parchment skin. In very wet weather, if the cherry is not gathered in good time, some will be found to split when dead ripe, and either drop to seed or drop off altogether. This splitting discolours the parchment, too, and every effort should be made to get the crop in before much can take place. In very dry seasons a little will be found to dry on the trees in spite of careful and regular picking. This cannot be avoided, but should be a very small percentage. This dry crop should not be put through the machine with the ripe, but picked separately if possible, dried as it is, and subsequently mixed with the "tails." The time for picking being just so soon as the crop shows red on the trees, it is not safe to leave it much longer, and, once red, there is no fear of it not separating properly in the pulper. Of course each berry cannot be tested by feel, but the grower will very soon, by testing a few, be able to tell by sight when it will pulp. It is obviously to the advantage of the grower to get the crop off the trees as soon as possible: Firstly, to get it cured and away; secondly, to save the strain on the trees; thirdly, to admit of the

subsequent berries ripening quickly, as well as having more sap to fill out with; and, fourthly to give the tree as much time as possible before and strength to blossom again.

An estate on which the berries are allowed to ripen too much seldom pays, for not only does the picking cost more, but it drags out its weary length to the detriment of everything after it, until, the blossoming season coming round again, the tree can make but a poor show under the circumstances. It is often of great advantage to "strip"—*i.e.*, in the last round of picking, to take off every berry whether green or ripe, and to subsequently sort out and pulp the ripe stuff and dry the other in the skin, adding it to the dry cherry, of which there is always some in a coffee crop. This does not necessarily mean all loss either, as the strippings dry quicker and better green than cherries will, and make good second-class coffee when cleaned.

How to Pick.—The picking is generally considered, especially by those who don't grow coffee, a formidable task and an insurmountable difficulty in the cultivation of coffee. There is no getting away from the monotony of steady picking, but, if properly set about, a great deal of the monotony is removed and a great deal more work can be got through. In choosing, as has been done to a great extent hitherto, only the dead ripe, it can be understood how much time is wasted in selecting and leaving, while, if all that is sufficiently red to admit of pulping is taken off at the one time, half the trouble and cost is removed at once, for the cost of picking depends a great deal upon the quantity available at the time of picking.

In pulling off the cherry, if each is picked with the finger and thumb separately and from above, a very little can be gathered in the day, especially if a billy-can is carried in one hand, as I have seen done, and only one hand used for picking; 50 lb. of cherries is in this way made a hard day's task. For quick picking a small bag should be tied round the waist or hung round the neck, which can be held open by a bent piece of wire if desired, and both hands used for the gathering. If the hands are held together, and the picking always started from the middle of the tree outwards, it will be found that it is comparatively easy to pull off the beans with the thumbs, or first fingers and thumbs, and to drop them into the palms of the hands thus held together. In this way a double handful of cherry will be quickly collected, and is easily deposited in the bag at the waist or chest by one natural movement, before the hands are stretched out again to pick along another branch. In this way 200 lb. and more will not be found a heavy task for one day's work. The bearing that pruning has upon the cost of picking can now be seen. In looking into the matter of expensive picking, or the small quantities gathered hitherto in Queensland, I find that in all instances the trees were unpruned, and in most were matted and thick, if not tall and out of reach. The crop from a tree having its branches regularly and systematically arranged can be got in in half the time of that from a tree that needs one hand to hold the branches back, a contortionist to get at the crop, or a step ladder to reach it.

Systematic pruning previous to the cropping means not only easier and quicker picking, more crop, better sample or quality—*i.e.*, bigger berries—but a more systematic ripening, thus again materially reducing the cost of gathering. It will be readily seen, therefore, that the picking must of necessity cost more on a badly cultivated than on a well-worked estate.

Ordinarily there should be as many distinct pickings over the estate as there were blossomings, but when the blossomings are close together, when ripe, it is difficult to distinguish between the different settings. Five to seven times round the estate, with ten days to a fortnight between the beginning of each round, should get the crop off. The first is a small pick gathered from a few trees that are in favoured situations, and ripen their crops specially quickly, and, coming only from a few trees here and there, is called a "fly-picking." The third and fourth pickings will bring most of the cherry into the sheds. Systematic work in picking is as necessary and useful as in weeding or any

other work, and if the estate is regularly picked over, line by line, from one end to the other at first, the subsequent ripening will be more regular and more easily dealt with. At present, in Queensland, it will be found necessary to pick more frequently than once a fortnight, perhaps, and, in many cases, eight or ten times round the estate will be necessary, but this can, in time, be very materially reduced.

With attention to these points, it will be found that a wage of from 20s. to 30s. a week could be made at 4 lb. to the 1d. by a fair ordinary picker, except for the first or "fly-picking" or so. Cheap picking, however, cannot be expected from trees that not only offer every obstruction to the picker, but produce small berries at the same time from want of cultivation. Some attention to this important branch of field work and methodical procedure will not only remove the apparent formidableness of the task, and the grower surprise himself at the amount he can pick, but a very marked improvement will very soon become evident in the sample of his coffee.

COFFEE ON THE CLARENCE.

Many persons who have grown coffee in the South of Queensland have affirmed that it will only prove remunerative in certain favoured localities, such as the Buderim Mountain and parts of the Blackall Range. Others go so far as to say that coffee cannot be profitably grown anywhere south of Mackay. The Clarence River is very far south of Brisbane, yet we learn from the *Farmer and Grazier* that Mr. John Ball, of Chatsworth Island, has been most successful with his coffee crop this year. His last crop returned 1,694 lb., which sold at 1s. to 1s. 3d. per lb. This year the crop is expected to amount to something like 6,000 lb. Mr. Ball has mastered the manufacture of coffee of the highest quality, and finds a good demand for it. His trouble is to secure sufficient quantities of beans. In reply to inquiries made of Mr. Holmes, a planter in Fiji, Mr. Ball has been informed that, owing to unsatisfactory prices offering in Sydney for the Fijian bean, the growers there were abandoning coffee-growing. Mr. Holmes forwarded Mr. Ball some seeds of the Liberia coffee, which is a sturdy-growing tree with deep tap root, and which bears a larger berry than the ordinary Arabian variety. In Fiji, even at the extremely low prices (3d. to 5d. per lb.) paid for the beans, this variety returned 4s. 7d. per tree. Mr. Ball finds that he can pay 10d. a lb. for good beans. His harvesting is done by lads, who are able to earn 15s. a week at the work.

MORE ABOUT COFFEE-TEA.

The British North Borneo Herald says:—

"In our issue of the 16th ultimo we reprinted an article from *Planting Opinion* on the subject of tea made from coffee-leaves, which, according to the writer, furnishes a most agreeable and refreshing drink, besides being the only non-intoxicating drink the Sumatran believes in. This discovery, or rather the revival of the fact, seems to have evoked considerable interest in more than one quarter, and a letter from the late Superintendent of the Mountain Section of the Government Botanic Garden, Buitenzorg, Java, to the editor of the *Straits Times* reveals a knowledge of the subject that is both expert and interesting."

The correspondent writes:—

"I was very much interested to read in your issue of the 13th ultimo something about the use of dried coffee-leaves. I am of the same opinion as the *Locomotief*—that coffee-planters ought not to put too much trust in coffee-berries on a falling market, but ought to seek salvation in the leaves by drying them as the Malays of Sumatra do, in order to obtain a marketable article, which would find without any doubt many consumers among the natives of Malaya, Sumatra, and some parts of Java."

There is a good chance that even Europeans will find it a refreshing beverage if "coffee-tea" is well prepared. In Germany and Holland, the lower classes all drink a beverage which they call coffee. That is, however, but a name, as a minimum quantity of ground coffee is mixed with ground chicory-root, and the result is a nasty-tasting beverage. I am of opinion that even among these classes "coffee-tea" would become popular, it being, without doubt, a much better tasting beverage than the one abovementioned. In the beginning of 1898, being on the west coast of Sumatra, I had the opportunity of making some experiments with coffee-leaves and obtained very satisfactory results, so that I may conclude that heaps of coffee-leaves now thrown away in pruning and topping the trees would bring a great profit to coffee-planters, and I even think that a coffee estate—or at least part of it—can be worked in preparing the leaves to sell to native consumers in the beginning, and later on in having them shipped to Europe. Also, I know markets where the prepared leaves will find a ready sale among natives.

[In the August (1900) issue of this *Journal* we printed a short notice of coffee-tea, and gave our own experience of its value. If coffee-planters would make a trial of an infusion of coffee-leaves as a beverage, we should be glad to publish their experience.—Ed. *Q.A.J.*]

THE AMERICAN COTTON-SEED INDUSTRY.

In bygone days cotton-planters considered cotton seed to be an unavoidable nuisance. They burned it, dumped it into the rivers, used it as manure, or as filling-up stuff—anything to get rid of it. American wit, however, has turned into a vast and profitable channel this one-time burden. It was found that a ton of cotton seed would produce from 35 to 40 lb. of oil, and that every particle of the residue would be made into a marketable article. There are to-day 500 mills in the Southern States representing an investment of £5,000,000, and the yearly value of the products from these mills is over £10,000,000. In Texas the mills pay from £2 10s. to £3 per ton for cotton seed, which means 25s. to 29s. per bale of cotton if all the seed is sold. It takes about 1,500 to 1,600 lb. of cotton in the seed to produce 500 lb. of clean lint. Now, a Mr. Robt. Thomas, of Atlanta, Georgia, has invented a process by which finer and better paper can be made from cotton-seed hulls than from wood pulp. As we noted in the last issue of the *Journal*, a company with a capital of £1,000,000 has been formed to erect a chain of paper-mills throughout the south—in Georgia, Alabama, Mississippi, Louisiana, Florida, and Texas. The first of these plants, one costing 300,000 dollars (about £60,000), will be erected at Atlanta, Ga.

Years ago it was predicted that the day would come when a process would be discovered to manufacture, at small cost, paper from either the seed, lint, or stalk of cotton. There is every reason to believe that this industry, if it proves the success that is promised, will, as Mr. Thomas says, so increase the demand for cotton seed as to raise the present price of 12 dollars (£2 10s.) a ton to 30 dollars (£6 5s.) or more. Hitherto the value of the seed has been based mainly on the oil and meal left after the extraction of the oil. If the price of the seed is increased to 30 dollars a ton by the demand for paper made from the hulls, it is estimated that the new industry will add fully 100,000,000 dollars (£21,000,000) to the value of the cotton crop of the South.

If any Queensland farmers are thinking of again growing cotton, they have no time to lose in obtaining seed from the United States, as the company's first mill was to start operations in March.

HAWAII'S INCENTIVE TO PERFECTION OF LABOUR-SAVING MACHINERY.

Referring to a paragraph in last month's *Journal*, announcing that the Hawaiian Sugar Planters' Association are offering substantial prizes to designers of a cane-cutting machine, and a machine for transporting and loading cane into cars, we are now enabled to furnish the following report embodied in the proceedings of the twentieth annual meeting of the association, published in the *Planters' Monthly* :—

The committee's suggestion that the proposed reward be divided in three parts, as follows, was accepted :—

1st. A reward of 2,000 dollars (£416) for the best practicable design of a machine for cutting cane. The competitors would be required to submit detail and assembly drawings of the machine, with a full description of its action. The judges should have it in their discretion to decide whether or not the designs were sufficiently nearly practical to warrant their paying the whole or any part of the reward offered. They should also be authorised to accept special parts from various designs submitted to be incorporated by the judges in one final design ; in which case the reward should be divided amongst the different competitors, parts of whose inventions are accepted.

2nd. A further reward of 3,000 dollars (£624) for the successful working of the machine when built in accordance with the design accepted. The judges having selected the design, if a sufficiently satisfactory mechanism has been invented in the opinion of the judges to make it worth while to proceed, the association should manufacture the machine and test same, giving the inventor this further reward if the machine works sufficiently well to warrant a reward.

It should be the privilege of any inventor of a rejected design or otherwise to manufacture his machine (at his own expense) and exhibit its workings in the field by the side of the machine constructed by the association in competition with said machine.

If this machine obtains first place, the Hawaiian Sugar Planter's Association should pay such competitor, who had not previously received a reward, the sum of 5,000 dollars (£1,040). In this case the machine should be purchased by the Hawaiian Sugar Planters' Association at its actual cost landed in Honolulu.

If a machine built by the association from parts of several designs secure first place, the reward of 3,000 dollars additional should be divided at the discretion of the judges among the inventors of said designs.

The judges should be authorised to award a part of the prize for a machine if it showed a useful invention, even though no really practical cane-cutter were produced.

3rd. A reward of 1,500 dollars (£312) for the best design of a cane transporter and loader into cars. We believe that a good deal of attention is now being given to such a machine, and think the reward therefore sufficient.

Discretion should be given to the judges to accept the whole or any part of a design, which should then become the property of the association.

Any design or machine accepted by the association by payment of a reward and cost of machine should become the property of the association as far as concerns manufacture in the Hawaiian Islands.

The trustees should endeavour to arrange that foreign machines be allowed landing to participate in the trials without paying duty.

RUBBER IN GUIANA.

The exports of india-rubber from French-Guiana have largely increased since 1891, the amount exported in that year being 829,000 kilos ; in 1892, 952,000 kilos ; in 1893, 996,466 kilos ; in 1894, 996,000 kilos ; in 1895, 947,000 kilos ; in 1896, 951,000 kilos ; in 1897, 1,399,000 kilos ; in 1898, 1,693,000 kilos ; and in 1899, 1,857,130 kilos, or nearly 2,000 tons.—*Engineering*.

Science.

TANNING BARK.

The quantity of tan bark imported into the State of Queensland annually (2,444 tons in 1900, valued at £18,467) naturally leads to the inquiry :—“ Can sufficient bark not be obtained from the forests of this immense territory, to obviate the necessity for these importations ?” The wattle-tree (of several kinds) grows in vast quantities, and attains a comparatively large size in almost all parts of the coast country. Much also grows inland. Although the cultivation of the wattle is carried on extensively in South Australia, New Zealand, Victoria, and Tasmania, where the plantations yield from £25 to £30 per acre, nothing has yet been done in this direction in Queensland, although we have given full particulars concerning the industry in this *Journal* (Vol. III., p. 468, and Vol. V., p. 502).

Lately some samples of tan bark from Cairns, Tasmania, and New Zealand were sent to the Queensland Department of Agriculture, and these have been carefully analysed by Mr. J. C. Brünnich, Agriculturist Chemist to the Department.

The results as given below show that the Queensland (Cairns) bark is of very good quality, containing a much higher percentage of tannic acid than either the Tasmanian or New Zealand barks, and also less foreign inactive bodies.

The tree from which the Cairns bark has been taken is not yet known, but steps have been taken to secure foliage for identification by the Colonial Botanist. The following are the analyses made by Mr. Brünnich :—

	Cairns Bark.	Tasmanian Bark.	New Zealand Bark.
	Per Cent.	Per Cent.	Per Cent.
Moisture	9·35	10·34	9·53
Resinous gums, &c.	·75	1·40	·61
Ash (insoluble)	3 08	1·71	1·63
Matters soluble in water	47·90	40·48	39 80
Of which—			
Tannic acid	39·50	29 60	27·65
Pectin bodies	6·70	9·92	11·96
Soluble ash	1·70	·96	·84

In addition to the above, Mr. Brünnich has since made analyses of South Australian and Victorian wattle bark, supplied by Mr. H. J. Gallagher, of the Kedron Tannery. In reference to the analyses made, Mr. Brünnich points out that they were made almost complete analyses, in order to get data to compare the unknown bark from Cairns with ordinary wattle bark. The result of the analyses of the South Australian bark shows it to be richer in tannin than the samples of Tasmanian and New Zealand bark, but still to be poorer than the sample of Cairns bark :—

Analysis of South Australian Bark.

	Per Cent.
Moisture... ..	9·46
Resinous gums	1·80
Soluble in water... ..	42·40
Of which—	
Tannin	31·25
Soluble ash	1·64
Pectin bodies, &c.	10·51
Insoluble ash	1·69*

* The analysis of the Victorian bark had not reached us up to the time of going to press.
—Ed. Q.A.J.

HAIL-PREVENTION.

During the first week of February last, news was received from several parts of the country that heavy hailstorms had wrought havoc amongst the orchards of parts of the Downs and Caboolture districts. One farmer at the South Pine lost 20,000 bunches of bananas, valued at £100. Others had their vineyards wrecked, fruit trees broken and the fruit destroyed, cows and fowls killed.

In the January issue of this *Journal* we described the latest form of mortar used in Austria, Italy, and France for the dispersal of storm clouds and hail. They are constructed of sheet iron, and are in the form of an inverted cone. The powder charge is about 5 oz. The cost of the mortar and of a shed for ammunition is about £10; and the annual expense, including 500 charges, is set down at between £3 and £4. Now, if the orchardists had combined to purchase two such mortars, and had used them on the appearance of the storm clouds, their fruit crops, cattle, and fowls would have been saved. Each mortar protects an area of 60 acres. We take the following article on this important subject from the *Scientific American*, a high-class journal noted for the accuracy of its information:—

SHOOTING AT THE CLOUDS.

The practice of “shooting at the clouds” with cannon or other specially constructed contrivances for the purpose of dispelling threatened hailstorms is rapidly changing from the odd to the common-place throughout Europe. In Continental newspapers one reads at present of the systematic use of artificial storm-destroyers in almost every country where agriculture forms the chief mainstay of prosperity. In many parts of France, Italy, Germany, and Austria, the custom has grown so extensively that it often forms an official department of the municipality. In such cases, with the assistance of the neighbouring landowners and farmers, thorough systems have been devised, until the elements have become so firmly harnessed that it is almost impossible for them to inflict injury or destruction to crops.

Indeed, so widespread is the public interest in this valuable aid to agriculture at present that the leading agricultural societies have taken up the subject, with a view to contributing to the means already employed the results of their minute investigations. In Vienna recently, a congress of the members of the Meteorological Institute was called, at which the various methods of cloud-shooting were exhaustively discussed, and many new experiments were inspired, which cannot fail to be of great benefit to the farmers in the districts peculiarly susceptible to the ravages of hailstorms.

From the report of the proceedings of this congress, it seems that the idea of averting storms by means of cannon shots is not a new one in Austria. It was first introduced during the reign of Empress Maria Theresa, who issued a decree prohibiting the use of cannon by the peasantry shortly after the adoption of the practice. In time, however, this decree was overruled, and in the year 1896 the burgomaster of Windish-Feistritz, in Styria, again introduced the method in Austria, substituting in place of the ordinary cannon a new weapon. This consisted of a funnel-shaped barrel of sheet iron, $6\frac{1}{2}$ feet long, and 79 centimeters (26·8 inches) in diameter at the muzzle and 20 centimeters (7·8 inches) at the base. The idea of the broad muzzle was to distribute the discharge over greater space, and thus to increase the effect. So successful were the results attained by the burgomaster's experiments that in 1897 the municipality of Windish-Feistritz counted no less than thirty shooting stations; since when there have been no hailstorms whatever in that locality.

Nowhere, however, has cloud-shooting found such general usage as in the vicinity of Venice, Lombardy, and Piedmont—districts that formerly suffered fearfully from the destructiveness of hailstorms. During the summer of last year there were at least 2,000 stations, built on the plan of those constructed in Styria. At a congress held a short time ago in Casale Monferato it was

found that in numerous localities where shooting stations had not been introduced, hailstorms were still of frequent occurrence, causing immense damage to crops and property, whereas the districts protected by artificial means were entirely free from loss from such causes.

In a speech delivered before the Vienna Meteorological Institute in Vienna, a few weeks ago, Burgomaster Stiger, the originator of the present method, gave some interesting facts regarding his first experiments with the cloud-shooting cannon. He began his experiments with the fundamental principle of disturbing the intense stillness preceding a hailstorm. In view of the established fact that there is no physical reason why sound waves should exercise an effect on the formation of hail, Stiger determined that it would be necessary to confine his operations to creating a form of whirlwind. An official trial in 1897, conducted by an expert, demonstrated that after the firing of a shot a small whirlwind arises, easily perceptible in the reflected sunshine. This whirlwind ascends with a piercing whistle, the sound lasting for thirteen seconds in day time, and twenty seconds at night.

During this experiment it was noticed that a swallow which flew within the radius of one of these whirlwinds instantly dropped dead. On examination the bird had the appearance of being shot.

The mechanical energy created by the wind thus produced, upon which Stiger laid great stress, found few supporters in Europe until at the congress in Casale, Italy, a Professor Roberts reported that at a distance of 240 feet the wind had destroyed a strong diaphragm. Thereafter several experiments held at St. Catherine demonstrated that the whirlwind was the main if not the sole agent in diverting hail.

Some careful experiments were carried on in Austria during the early spring, mention of which may also be of interest at this point. The experts who attended the exhibition could plainly see the wind rise from the mouths of the funnels with lightning rapidity, possessing all the aspects of a shot. When large cannon were used, whistling could be heard for twenty to twenty-eight seconds. The most marked effects, however, were produced by horizontal shots. For the experiments, shields built of thick paper and linen were placed at intervals of 40, 60, 80, and 100 yards from the mouth of the cannon. When the circle of wind enfolded these shields, the heavy linen and paper were torn from the frames, the solid posts and framework snapped in two and cast from 18 to 22 yards, while a large mastiff standing near was lifted into the air and, after turning several rapid somersaults, hurled against the ground with such force that his interest in cloud-shooting demonstrations was effectually dispelled.

It is calculated that these artificial whirlwinds carry their energy to a height of 1,600 to 2,000 yards, thus accounting for their effect on the clouds. As regards the creation of the wind, the explanation is that the air circulating in the mouth of the funnel is set in motion by the explosion of the powder, and hurled forth in a ball that expands upon leaving the funnel until its full force is reached some distance overhead. In actual operation rapid firing is avoided, its effect being to diminish the force of the wind. The shooting must be done during the quiet preceding the storm. Only quick matches or fuses should be used, percussion caps and similar inventions being barred.

RUBBER IN PERU.

The German Consul in Payta-Piara (Peru) reports the discovery of large rubber forests on the Niera River, a branch of the Amazon, which can be reached from the middle of the tobacco plantations by an eight-days' journey. Several German firms organised a large expedition to start for the interior and to secure the rights to collect the rubber. As the natives are very poor, it is expected that cheap native labour will facilitate the collection.—*Engineering*.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1899.	1900.											
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
<i>North.</i>													
Bowen ...	2.92	7.61	0.40	0.88	0.59	0.89	1.14	0.96	0.76	0.12	0.31	0.05	2.30
Cairns ...	4.57	43.06	1.98	8.90	3.77	3.56	1.66	0.20	Nil.	2.44	1.52	1.61	4.19
Geraldton ...	4.89	62.26	2.36	8.86	8.86	8.33	2.34	1.02	Nil.	2.63	3.17	2.39	18.68
Herberton ...	0.73	11.90	0.23	1.97	2.19	0.57	0.12	0.98	Nil.	0.74	Nil.	3.11	4.01
Hughenden ...	0.33	6.43	1.04	0.01	Nil.	0.11	0.02	2.45	Nil.	0.14	Nil.	0.10	0.61
Kamerunga ...	...	...	1.01	8.60	3.25	3.65	Nil.	0.18	0.03	1.42	1.98	1.28	2.38
Longreach ...	Nil.	1.68	0.48	Nil.	Nil.	0.14	Nil.	2.34	0.50	Nil.	Nil.	0.19	0.11
Lucinda ...	1.02	37.35	1.71	4.90	4.44	9.08	1.10	1.04	0.08	0.44	1.33	0.88	2.48
Mackay ...	7.65	20.86	0.65	4.12	2.40	2.89	2.00	3.25	0.74	1.19	0.48	0.12	7.00
Rockhampton ...	11.02	4.53	0.25	1.64	0.93	1.38	0.71	1.70	0.92	2.52	0.53	1.15	0.68
Townsville ...	0.53	21.09	0.07	1.68	0.87	2.31	0.41	0.57	0.12	0.25	0.91	0.05	0.76
<i>South.</i>													
Barcaldine ...	0.04	3.08	0.65	0.09	2.03	1.38	0.29	4.38	1.63	0.03	Nil.	0.30	1.20
Beenleigh ...	7.40	5.42	3.19	3.16	1.25	7.55	2.18	4.77	1.06	1.90	0.26	2.80	1.49
Biggenden ...	...	...	0.40	2.81	0.28	3.06	1.43	3.23	0.98	3.07	0.87	1.65	0.06
Blackall ...	0.85	1.73	1.31	0.63	0.63	2.19	0.33	2.21	0.66	0.12	Nil.	0.29	0.17
Brisbane ...	7.61	6.51	5.18	3.37	1.38	5.45	2.68	4.36	0.79	1.52	0.14	2.48	0.55
Bundaberg ...	7.62	4.63	0.86	1.86	1.15	3.97	1.46	5.20	1.14	1.56	3.05	1.06	1.28
Caboolture ...	7.44	3.04	4.18	5.66	1.42	7.04	2.14	3.73	1.56	2.94	1.99	0.86	2.11
Charleville ...	0.16	1.01	0.08	0.79	Nil.	1.15	1.31	1.80	0.13	0.59	0.13	0.19	1.13
Dalby ...	2.89	0.41	6.31	2.80	2.46	2.54	1.29	1.70	1.72	1.67	Nil.	1.77	3.37
Emerald ...	0.40	3.08	1.22	3.97	0.42	2.72	1.15	3.96	0.52	0.35	0.18	0.31	1.08
Esk ...	5.34	1.42	2.34	4.73	1.50	4.78	1.89	2.85	1.39	3.00	Nil.	1.35	1.80
Gatton College	5.87	2.40	4.07	3.13	2.24	4.24	1.15	2.73	1.33	2.81	Nil.	4.12	0.47
Gayndah ...	7.37	2.52	2.07	1.11	1.22	2.57	0.88	3.36	1.42	3.28	3.21	1.84	0.08
Gindie ...	...	...	0.57	1.04	0.96	3.01	0.92	3.01	0.55	0.22	0.27	0.49	1.32
Gympie ...	6.44	5.59	1.84	2.76	1.05	3.63	0.82	3.34	0.84	5.67	0.18	0.84	0.47
Ipswich ...	4.66	2.79	1.66	1.85	1.47	4.73	1.45	2.25	1.17	1.57	0.01	3.93	0.47
Laidley ...	6.50	0.64	3.15	2.87	1.94	4.36	1.41	2.28	1.08	2.9	Nil.	4.55	0.63
Maryborough ...	4.13	4.88	1.78	3.26	1.17	4.33	1.21	4.32	0.57	3.55	1.22	0.68	1.18
Nambour ...	11.11	4.07	5.64	4.67	2.78	7.77	1.35	3.42	1.81	4.15	0.52	1.91	2.19
Nerang ...	6.31	4.60	3.37	3.06	0.47	18.28	2.84	7.74	1.08	2.79	0.26	3.02	2.92
Roma ...	0.99	0.43	1.52	4.40	0.23	2.07	2.14	2.14	1.05	0.77	0.66	2.20	3.28
Stanthorpe ...	3.22	2.62	4.81	1.87	1.70	3.17	1.22	2.26	1.50	3.98	0.23	2.17	2.16
Taroom ...	0.65	1.78	3.65	2.92	2.11	2.55	1.40	2.46	2.92	2.26	1.47	0.45	0.29
Tambo ...	0.66	2.28	1.55	0.30	0.02	2.94	1.49	1.75	0.59	0.19	Nil.	1.87	1.52
Tewantin ...	8.22	1.69	4.87	5.36	1.02	5.90	3.03	5.89	1.97	5.78	1.48	0.74	0.95
Texas ...	2.67	1.56	3.39	1.63	1.48	3.35	1.86	2.72	0.66	2.68	0.35	2.67	3.33
Toowoomba ...	4.75	1.01	2.90	2.87	2.00	4.67	1.69	2.47	1.35	1.95	0.43	2.42	2.40
Warwick ...	3.88	1.84	4.19	1.93	1.01	3.31	1.23	1.99	1.11	2.72	0.13	2.01	2.50
Westbrook ...	...	...	3.71	1.78	1.81	3.04	1.16	1.85	1.18	0.60	0.04	4.59	1.35

ARCHD. W. ANDERSON,
Acting Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, choicest, 110s. to 114s. ; second quality, 104s. to 108s. ; Danish, 115s. 6d. to 128s. ; Canadian, 104s. to 110s. per cwt.

CHEESE.—American, 52s. to 53s. ; Canadian, 54s. to 55s. ; New Zealand, 50s. to 54s. ; Queensland, no quotation.

SUGAR.—Refined, £15 9s. to £16 6s. per ton ; German beet, 88 per cent., 8s. per cwt.

SYRUPS.—Finest, 12s. 6d. per cwt.

MOLASSES.—5s. 3d. to 6s. 6d. per cwt.

RICE.—Rangoon £6 15s. to £7; Japan, £13 10s. to £14; Java, fine to finest, £15 to £17; Patna, fine, £13 to £20 per ton.

COFFEE, in bond (duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon Plantation, small to good middling, 43s. to 70s.; finest, 80s. to 110s.; pea-berry, 48s. to 115s.; Santos, 42s. to 62s.; Mocha, 80s. to 106s.; Jamaica, finest, 95s. to 115s. per cwt.

ARROWROOT.—St. Vincent, $2\frac{1}{2}$ d. to $5\frac{1}{2}$ d.; Natal, $6\frac{1}{2}$ d. to $7\frac{1}{2}$ d.; Bermuda, 1s. 9d. to 2s. per lb.

WHEAT.—Australian, 31s. to 32s.; Duluth, 34s.; Manitoba, 33s. to 34s. per 480 lb.

MALTING BARLEY.—English, 24s. to 38s. per 448 lb.; Californian, 26s. 6d. per quarter.

OATS.—New Zealand, 23s. to 29s. per 384 lb.; Canadian, 15s. to 16s. per 320 lb.

SPLIT PEAS.—Australian, 36s. to 40s. per 504 lb.

GINGER.—Calicut, good medium, 63s.; medium, cut rough, 45s.; small, cut rough, 39s.; Japan, rough, heavily limed, 29s. 6d.; Jamaica, good bright, 62s.; middling to fair, 45s. to 51s. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; chillies, Zanzibar, 37s. to 43s. per cwt.

TOBACCO.—Virginia Leaf: Common to middling, $2\frac{1}{2}$ d. to 6d. per lb.; colory and good to fine, $4\frac{1}{2}$ d. to 1s. 1d. Strips: Common to middling, 4d. to 8d.; good, fine, and colory, 8d. to 1s. 3d. Kentucky Leaf: Common to middling, $2\frac{1}{2}$ d. to $5\frac{1}{2}$ d.; colory, good, and fine, $7\frac{1}{2}$ d. to $9\frac{1}{2}$ d. Strips: Common to middling, $3\frac{1}{2}$ d. to $7\frac{1}{2}$ d.; good and fine, 8d. to 11d. Maryland and Ohio, $4\frac{1}{2}$ d. to 10d. Negrohead and Cavendish: Common and heated, middling to good, fine, bright and soft pressed, 4d. to 1s. 3d. Columbian, 3d. to 2s.; Java, 4d. to 10d.; Turkey, 4d. to 11d.; Japan, 5d. to $8\frac{1}{2}$ d.; China, 5d. to 7d.; Sumatra, 7d. to 5s.; Latakia, 4d. to 11d. nom.; Paraguay, 3d. nom.; Greek, 3d. to 5d.; German and Dutch, 4d. to 1s. 4d.; Manilla, 3d. to 4s.; Havannah, 8d. to 5s.; Cara and Cuba, 5d. to 2s.; Esmeralda, 7d. to 10d.; cigars, 1s. 3d. to 40s.; cheroots and cigars, Manilla, 2s. to 3s.

WINE.—Australian Burgundy: Wotonga, red, 13s. per dozen bottles to 17s. per dozen quart flagons; Waratah, red, 18s. to 23s. per dozen. Fair, red claret, Australian, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon.

GREEN FRUIT.—Apples, Nova Scotian, 10s. to 20s. per barrel; English, 2s. 6d. to 7s. 6d. per bushel; Newtown, 20s. to 24s. per barrel. Almeria grapes, choice, 21s.; choicest, 23s. to 25s. per barrel; English grapes, 9d. to 2s. per lb. Bananas, 12s. to 14s. per bunch. Pineapples, 3s. to 5s. each. Oranges, Valencia, common, 10s. 6d. to 12s.; medium, 15s. to 16s.; finest selected, 22s. to 35s. per 420. Lemons, Messina, selected, 22s. to 25s.; ordinary, 7s. to 14s. per 420. Apricots, Australian, 25-lb. boxes, very fine, 65s.

HONEY.—32s. to 45s. per cwt.

COTTON SEED.—Crushed, 20 to 25 per cent. oil, prime, in bags, £7 5s. per ton.

OIL CAKE.—Cotton seed, £5; decorticated, £6 15s. to £6 17s. 6d. per ton; Irish, 11s. to 12s.

EGGS.—French, 7s. 9d. to 9s. 6d.; Italian, 7s. 9d. to 9s. 6d.; Russian, 7s. 9d. to 9s. 6d. per 120; Canadian, preserved, 7s. 6d. to 7s. 10d.

BEE SWAX.—Pure, 1s. 5d. to 1s. 8d. per lb.

LINSEED.—£2 14s. to £2 17s. 6d. per 410 lb.

LINSEED OIL.—30s. per cwt.

LINSEED CAKE.—£7 12s. 6d. to £8 12s. 6d. to £9 per ton.

OLIVE OIL.—£35 to £39 10s. per tun ; eating oil, £50 ; Lucca oil, 3s. 9d. to 5s. per gallon.

HEMP.—Riga, £34 ; Sisal, £23 ; Ramie ribbons, £15 ; New Zealand, £21 per ton.

RUBBER.—Para, fine, 4s. to 4s. 2d. per lb. ; West Indian, 2s. to 2s. 10d ; Mozambique, 2s. 6d. to 3s. 6d.

DATES.—Egyptian, 22s. ; Tunis, fine, 50s. per cwt.

WOOL.—The London wool sales closed on 9th February. Prices were fully maintained.

AUSTRALIAN FROZEN MEAT.—Australian frozen meat was quoted on the London market on the 9th ultimo at the following rates, for parcels of 25 quarters of beef or 100 sheep or lambs, and all of fair average quality :—

Ox hinds (160 to 200 lb.)	...	...	...	...	3 3/4d.
Ox fores	"	"	...	...	3 3/16d.
(Crossbred and Merino Wethers.)					
Heavy (over 50 lb.)	...	...	...	..	4 1/16d.
Light (under 50 lb.)	...	...	...	...	3 7/8d.
Lambs, prime (32 to 40 lb.)	...	...	...	...	5 1/2d.
Fair average	"	...	...	...	4 3/4d.

This shows a falling off of 1/16d. per lb. in both heavy mutton and ox hinds on the previous week.

BACON.—Irish, 56s. to 66s. ; Danish, 54s. to 65s. ; Canadian, 52s. to 58s. per cwt.

HAMS.—Irish, 90s. to 104s. ; Canadian, 48s. to 52s. per cwt.

HIDES.—Light and medium, firmer ; heavies, 4½d. to 6½d.

TALLOW.—Mutton, fine, 29s. ; medium, 26s. 3d. ; beef, fine, 27s. 6d. ; medium, 26s. 3d. per cwt.

ANOTHER REMEDY AGAINST ANTS.

The Bulletin of the Botanic Department of Jamaica gives the following recipe as a preventive against ants attacking fruit trees :—

A mixture prepared as follows is recommended to prevent ants and scale insects attacking trees or plants :—

White lime (slaked)	...	...	...	...	6 quarts
Kerosene oil...	...	...	...	...	½ pint
Turpentine	...	...	...	...	1 wine-glass
Soft soap	...	...	...	...	5 lb.
Cow dung	...	...	...	...	3 quarts
Water	...	...	...	...	16 quarts

Mix the whole thoroughly together, and apply freely with a paint brush or whitewash brush to the trunks of trees or stems of plants requiring protection. It is also a good remedy in case of trees already affected by pests, killing scale insects, &c., immediately.

If signs of "gumming" are observed in citrus trees, to the above mixture should be added ½-lb. of flowers of sulphur. The mixture adheres to the trunks and branches of trees for a considerable time, but, when it peels off, the bark beneath will be found to be perfectly clean and free from pests, both animal and vegetable.

It must be remembered that such remedies as the one here recommended cannot be expected to be permanently effectual, unless proper cultural methods are adopted, so that the trees and plants are kept in a healthy growing state. Healthy trees are not often attacked by insect pests.

Agricultural Patents.

PATENTS ACCEPTED.

CULTIVATORS FOR STEAM POWER.—Class 28—5584: Thomas Churchman Darby, Thomas Albert Darby, and Sidney Charles Darby, all of Pleshey Lodge, Pleshey, near Chelmsford, in the county of Essex, England, engineers. “Improvements in Implements or Apparatus for Cultivating Land.” Dated 21st July, 1900. (Drawings, 45s.; specification, 9s.) Improvements on 3824: Instead of the duck’s-foot cutter a pair of cutter discs on nearly vertical axis are carried on the vertical spindles which formerly drove the duck’s-foot cutter. The discs rotate by friction in the ground or by positive acting train-arm gear. Appliances for steering and raising the cutter frame are also described.

STOCK MEDICINE.—Classes 36 and 81—5215: Alexander Allison and James Allison, of Wanganui, New Zealand, settlers. “An Improved Medicinal Preparation for Sheep and other Animals.” Dated 9th October, 1899. (Specification, 4s. 6d.) The preparation consists mainly of certain wood ashes containing potash and phosphates with other ingredients as follows:—224 lb. ashes, 112 lb. salt, 10 lb. iron sulphate, 6 lb. lime, 4 lb. sulphur, 4 lb. gentian, and 2 lb. ginger; mixed dry and used as a lick, sometimes with molasses or other flavouring. Some charcoal may be used with the ashes.

COTTON GINS AND WOOL BURRERS.—Class 39: Thomas Henry Pearse, of 89 State street, Boston, county of Suffolk, State of Massachusetts, United States of America, gentleman (Assignee of Matthew Prior, of 15 Paten street, Watertown, county of Middlesex, State of Massachusetts, United States of America, inventor). “Improvements in Cotton Gins and Wool Burrers.” Dated 31st July, 1900. (Drawings, 50s.; specification, 12s. 6d.) The cotton is fed by an intermittent horizontal carrier against a vertical toothed belt operating in relation to a rotating doffer or distributor. The toothed belt delivers into a hopper below, where the fibres are separated by rapidly reciprocating stripping combs co-operating with a knife fixed close to the ginning roll; the roll is cased with a breast or nipping device leading the fibres to the lower side of the roll, where they are removed by a rotating doffing-brush, which drives the fibre over a grill and cleaning drum. The stripping combs have parallel blunt fingers, and are operated in sections by a polyphase eccentric to minimise vibration and facilitate renewals. In one form the stripping combs slide in lineal guides, and in another form (preferred for tangled fibre) the combs move in circular arcs on radius bars.

INTERCHANGEABLE DRAFT GEAR FOR TWO OR THREE HORSES.—Class 37: Absalom Yager, of Sydney, New South Wales, traveller. “Improvements in Whipple Trees and Horse Draught Gear for Common Road Vehicles and Agricultural Implements and Machinery.” Dated 9th August, 1900. (Drawings, 5s.; specification, 8s.) One balance bar and two swingle bars are made available for either two or three horses by making the fulcrum of the swingle bars movable from the centre of each to a point one-third from the inner end. For two horses the centre is used; for three horses the lateral fulcrum, and the inner conjoined traces from the centre and side horses pass over a pulley (or equivalent) on the short end of the swingle bar. The details are arranged for convenience of easy interchange of the style of driving.

ROAD-SWEEPER AND ELEVATOR.—Classes 60, 82: Henry James Ranger, of 183 Hereford street, Christchurch, in the colony of New Zealand, cycle engineer. “Improved Road-cleaning Machine.” Dated 6th August, 1900. (Drawings, 37s. 6d.; specification, 14s.) This machine is intended to be dragged behind a box or hopper cart that receives the sweepings. It is carried on two driving wheels and a trailing caster wheel. The driving axle has clutch gear to operate the sweepers through bevil gear, lateral shafts, and link chains. There are a pair of six-armed brush-wheels (one at each side) which sweep the track from the sides towards the centre, where the sweepings are brushed into a central pan into which a bucket-elevator dips, thus transferring the sweepings to the cart. The six brush-arms are guided by rollers on cam-races to be lifted

over the pan and elevator on the return part of their rotation. Suitable hand-levers are provided for disconnecting the sweeping and elevator gear, and for lifting the brushes off the road when desired.

PASTEURISING CREAM AND OTHER LIQUIDS.—Class 32: Arthur Percival Hall, of Coraki, Richmond River, in the colony of New South Wales, dairy manager. "Improved Apparatus for Pasteurising Cream, Milk, and other Liquids." Dated 7th August, 1900. (Drawings, 12s. 6d.; specification, 4s.) To avoid prolonged contact with the source of heat, the hydraulic mean depth of the stream of cream is reduced by the use of surface heating in divided tubes, through which the cream circulates; the tubes are preferably surrounded by a steam-heated water-jacket. In the apparatus illustrated there is a circle of vertical tubes connected to conical chambers at top and bottom with suitable inlet, outlet, and regulating taps; the cream leaving the upper and passes a thermometer to indicate that the proper temperature has been rapidly attained.

MOVING EGGS DURING INCUBATION.—Class 35—5690: Thomas Edward Woodhams Noyes, of 31 O'Connell street, Sydney, New South Wales, merchant (Assignee of George William Green, of Woy Woy, New South Wales, carpenter). "Improvements in Trays, Drawers, and other Egg Frames for Incubators." Dated 27th September, 1900. (Drawings, 10s.; specification, 5s. 6d.) A tray in the incubator is provided with a fixed bottom of wire-netting, and a removable frame of partitions between which the eggs lie longitudinally. Between the partitions and the netting is a false floor of open woven cloth, the ends of which are fastened to longitudinal rollers, so that it may be partially wound backwards and forwards transversely at the requisite intervals, thereby turning over all the eggs. During the last few days of incubation the false floor is not moved, and the partitions are removed to allow the chickens to walk about.

OPERATING GATES FROM A DISTANCE.—Class 35—5691: Jonas Herbert Craven, of Russell street, Bathurst, New South Wales, engineer. "An Improved Mechanism for Opening and Shutting Gates and the like." Dated 27th September, 1900. (Drawings, 15s.; specification, 4s. 6d.) This device is of the type in which the lower hinge pivot is shifted with relation to the centre of gravity of the gate, so that the gate swings open or shut. The lower pivot is formed on the outer end of a radius bar, pivoted to a sleeper, so that it can move in a circular path across the line of gate when closed. The outer end of the radius bar is supported by a roller under the pivot running on a circular path. The shifting of the radius bar is accomplished by a system of levers and ropes from any desired distance; and the upper pivot has screw adjustments to compensate for any irregular settlement.

OPERATING GATES AT A DISTANCE.—Class 35—5667: George Brownlees, of Naracoorte, South Australia, coachbuilder. "Improvements in Gate Fittings." Dated 4th September, 1900. (Drawings, 10s.; specification, 11s. 6d.) The weight of the gate is concentrated near the hinge end, and carried mainly by a roller bearing on a semi-circular rail. The hinge-post of the gate-frame carries at its top a backward lever extension from which lines extend in both directions to posts along the road for pulling the gate open. These lines pass round pulleys on the lever end and are carried diagonally to the gate-catch, which is thereby released before the gate begins to move. The gate is held open by catch-posts at the roadside, and to facilitate its return the outer ends of the semi-circular rail are formed with an up-incline. Another pair of lever arms perpendicular to the first mentioned carry similar lines for closing the gate.

PICRIC ACID TANNING.—Class 38—5648: Franz Walter Wartenberger, of Bei der Johanniskirche 14, city of Altona, province of Schleswig-Holstein, and kingdom of Prussia, Germany, tanner. "A New Tanning Process." Dated 25th August, 1900. (Drawings, nil.; specification, 4s.) The prepared hides are first soaked for some hours in a weak (though practically saturated) solution of picric acid, and afterwards in tan liquor to neutralise any excess of picric acid. The strength of the acid bath is maintained by adding additional picric acid at intervals of about half-an-hour.

General Notes.

ROADSIDE FRUIT TREES.

In the Grand Duchy of Luxemburg there is a special syndicate for effecting the sale of fruits. The cultivation of fruit trees has greatly increased of late years. The Government and the rural communes have, in a large measure, substituted fruit trees for the ash and poplar trees on the majority of public roads as wayside trees. The experiment has proved eminently successful. In 1899 the syndicate sold apples to the value of 31,000 francs (nearly £1,300) and pears to the value of 28,500 francs (£1,187) from the roadside trees alone. The money is expended in keeping the roads in good order.

A SUBSTITUTE FOR GUTTA-PERCHA.

In Zanzibar an interesting discovery has recently been made, that the fruit of a tree which grows principally at Dunga will, on being tapped with a knife, produce a white fluid, which when placed in boiling water coagulates into a substance closely resembling gutta-percha. This in the process of cooling becomes hard, but can in its previous soft state be moulded into any required shape. Should the material be found to be worth anything, a large source of revenue may be derived from it.—*Engineer*.

COTTON-SEED HULLS.

Some very important developments are about to take place in America in the paper-making trade. A company has been formed with a capital of £1,000,000, to manufacture paper from cotton-seed hulls, many billions of tons of which are lying in the cotton-producing States as refuse from the cotton-mills. One of the advantages of paper made from this material is said to be that it remains white, whilst that made from wood pulp turns yellow. The cotton-seed hulls are worth £5 per ton as against £15 per ton for wood pulp. The new company will also enter upon the production of cotton-seed oil on a very large scale.

PLUCKING CHICKENS BY MACHINERY.

Chickens are now (says *Science Siftings*) plucked in a wholesale manner by the use of pneumatic machinery. There is a receptacle in which the fowl is placed after being killed, and into this are turned several cross currents of air from electrical fans revolving at the rate of 5,000 turns per minute. In the twinkling of an eye the bird is stripped of its feathers, even to the tiniest particles of down, and the machine is ready for another. Needless to say, the machine is at work in America.

MENDING CHINA.

China may be mended as firmly as a rock in the following manner:—Two persons will be needed for the work, however, for the manipulation must be done rapidly. The necessary materials are a little unslacked lime, pulverised, the slightly-beaten white of egg, and a small hair brush, such as is used for gum. Put the white of egg on the broken edges of both pieces to be joined, and immediately dust one edge with the powdered lime; put the two edges accurately and firmly together, hold in place for a minute or two, and then lay aside to dry.

DESTROYING SPARROWS.

Mr. W. Carroll sends the following receipt for destroying sparrows to the New South Wales *Agricultural Gazette*:—"Make a large hen-coop divided into two compartments, one being much larger than the other. The coop can be well and cheaply made by constructing a skeleton framework, and covering it with coarse wire netting through which a sparrow can easily enter. Now set the coop in a conspicuous place frequented by sparrows. Enclose a fowl in the small end of the coop, and proceed to feed and water this bird carefully, scattering some wheat at the same time into the other compartment, also some outside to attract other fowls. In a few days the sparrows will begin to investigate, but should not, apparently, be noticed. In a short time they will be quite at home, coming to feed regularly. Then mix a little sugar and water with the wheat, afterwards adding some vinegar and sugar. When the sparrows take this readily, add strychnine. Procure a shilling's worth of the poison, which should be dissolved, and some vinegar and plenty of sugar added. Fill two ordinary pale-brandy bottles nearly full with dry wheat; pour half the poison mixture into each, fill up with warm water, and shake well. Let the bottles stand for twelve hours; then drain off the liquid, and break the bottles over a large sheet of paper; otherwise it is difficult to extract the wheat, which is afterwards placed in the sun for a few hours to dry. A small quantity is sprinkled in the unoccupied section of the coop when the fowl is getting its usual allowance of wheat. It is very deadly, one or two treated grains killing a sparrow. Always promptly remove the dead birds from about the coop. Cats will receive no injury from eating the bodies of birds poisoned in this way. All vessels used in mixing or handling the strychnine should be destroyed at once to prevent accidents."

TICK CURE.

Mr. I. Hopkins, Atherton, gives us a cure for scrub ticks. He says:—On my way from Burketown to Atherton, I had a cattle dog which got a tick into its neck. Half-an-hour after pulling the tick out of its neck, the dog became paralysed in the hindquarters, and could not walk. The next morning I injected with an hypodermic syringe one-fifteenth of a grain of strychnine from Dr. Mueller's snake-bite cure. I think the dose was a little too much, for the dog took two fits, but recovered quickly. He did not move for three days, except when lifted; and on the sixth day he got up and walked a little, and from that time forward he finally recovered. He has had a dozen ticks in him since then, but they have not affected him a bit—in fact, scarcely a week goes over but one is found on him with no bad result.

PROTECTING SEEDS FROM BIRDS.

There is no farmer who has not one day or another experienced the disappointment of having his seeds eaten in the field, either by destructive birds or by insects. A Belgian horticulturist, Mr. Charles Wendeln, claims the honour of having discovered a sure and inexpensive way of preventing such depredations. Just before sowing shake well, he says, your seeds with some powdered red minium. Red minium is a poisonous salt of lead, but is not dangerous to handle. Either its taste or its smell prevents the seed from being touched by any insect or bird. Crystals of naphthaline are said to give equally good results.

EXPORT OF EGGS FROM RUSSIA AND EGYPT.

Russia in 1899 exported 1,800,000,000 eggs, chiefly from the southern portion of the empire. In 1897, 13,670,000 eggs were sent from Egypt to England and France; in 1898, 34,982,000; in 1899, 39,761,000; and in the first four months of this year, 59,999,000 eggs; and England paid thus for these four months £65,915; France, £11,590; and other countries £3,503.

Last year Russian Poland sent 3,000,000 geese to Germany, and this trade is annually.

USEFUL HINTS.

To remove an obdurate screw, apply a red-hot iron to its head for a short time, the screw-driver being applied immediately the screw is hot.

To clean a lamp chimney, nothing is so good as a piece of newspaper. Drop a very small quantity of kerosene on it, and rub the chimney till it shines.

To stop the bleeding from a cut, apply a drop or two of creosote to the wound. Never use spider's web. Blood-poisoning often follows its use, owing to the deleterious substances it collects from the air.

To banish flies from a room, evaporate twenty drops of carbolic acid on a hot shovel. Mosquitoes may be driven out by holding a bit of camphor the size of a walnut over a lamp until it is consumed.

To get rid of rats, try putting chloride of lime into their runs. They detest the smell of the chloride.

To prevent ants climbing up fruit trees, bind strips of sheepskin smeared with tar round the trunk.

If boracic acid is suspected in milk, evaporate a small quantity to dryness, burn the total solids to obtain the ash, which moisten, dip in it a piece of yellow turmeric paper, which will become red if boracic acid is present.

To detect salicylic acid in milk, add a small quantity of ferric chloride; if salicylic acid is present, the milk will turn a deep purple colour.

To detect annatto in butter melt a small quantity, add to it some salicylic acid; if annatto be present, it will turn green.

Typhoid, contrary to a widely-spread fallacy, is not conveyed to the consumer in consequence of the cow having drunk foul water, but, if the pails are left about with milk in them, the disease germs may be taken into the milk. Scarlet fever may also be spread in this way.

WHEAT CROPS OF 1900-1901.

The wheat harvest being over and the crop either already threshed or in the stack, an idea may be formed of the general results in the principal wheat-growing States of the Commonwealth and of New Zealand. They are approximately as follows:—

					Bushels.
Victoria	...	...	...	...	18,870,000
New South Wales	...	...	...	...	17,195,000
South Australia	...	...	...	...	12,000,000
New Zealand (South Island)	...	...	...	...	5,172,000
Queensland	...	...	...	...	1,250,000
					54,487,000

This result is a considerable increase on the previous harvest, when the figures were:—

					Bushels.
Victoria	...	...	...	...	15,205,350
New South Wales	...	...	...	...	13,586,277
South Australia	...	...	...	...	8,453,135
New Zealand	...	...	...	...	7,695,121
Queensland	...	...	...	...	614,414
					45,550,297

The total value of the grain produced in the above five colonies is about £8,000,000, Queensland's share amounting to about £160,000.

The New Zealand returns are not complete.

REDUCING BONES.

There are several methods of reducing bones when no crushing mill is available. Boiling them with strong caustic lye is one of the quickest. Dissolve 10 lb. of caustic soda or 14 lb. of caustic potash in 3 gallons of water. This quantity will be sufficient for from 30 to 40 lb. of bones. You can either allow the bones to lie in the solution, when they will be disintegrated in a week or ten days, or you may boil the mass in an iron boiler for three hours, in which time they will be completely reduced.

Another method is to mix the bones in heaps with quicklime and loam. Make a layer of bones 6 inches deep. Over them place a layer of quicklime 3 inches deep, and over the lime a layer of 4 inches of loam. Repeat these layers in the same order until the heap has reached a convenient height. Finally, cover it with a thick layer of earth, then bore holes into the heap from the top, and pour in sufficient water to slake the lime. The whole mass then becomes hot, and will remain so for two or three months, when the bones will be found to be quite friable. When this occurs, mix up the whole heap and apply it to the land at the rate of from 10 cwt. to 15 cwt. per acre. It will prove to be a most valuable fertiliser for many crops. Yet another way is to pack the bones in layers interspersed with wood ashes taken fresh from the fire in a barrel with a thick layer of soil on top. Keep the mixture moistened for some months. As the original layers of bone are reduced, fresh layers may be added, first removing the top soil.

TO FIND THE AGE OF CATTLE FROM THEIR TEETH.

Dr. A. Bundle (Councillor of Health at Berlin) states that cattle change their inner middle incisors at two and a-half years, which are full grown at three years; they change their outer middle teeth at three and a-half years, and these are full grown at four years. At four and a-half years they change their corner teeth, which are full grown at five years, and their neck becomes visible at nine years. The neck of the molars shows in the seventh and eighth years. With twelve to fifteen years most of the teeth drop out.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Answers to Correspondents.

BEES AND FRUIT TREES.

Two correspondents write asking for information concerning the damage done to fruit by bees. We have already clearly shown on the best authority that bees do not injure either blossom or fruit. Mr. H. Tryon, Government Entomologist, wrote a very clear and exhaustive article on the subject in Volume II., pages 28 to 32, of this *Journal*, the last three lines of which read thus:—"Wherefore it may be concluded, from this and the foregoing statements, that bees, in so far as they frequent orange blossoms, are beneficial to the orchardist rather than prejudicial to its interests." If our correspondent, "Apiarist," North Queensland (we should prefer correspondents giving us their name and address), wishes for more on the subject he will find it in Volume I., page 265, Volume V., page 290, and Volume VI., page 42.

As to bees damaging fruit, we have also shown this to be fallacious. This is what Mr. R. Helms, bacteriologist, writes in the *Journal* of the Agricultural Department of Western Australia:—

The bee is deserving cultivation by the fruitgrower for the following reasons:—That when a number of fruit trees come into blossom, other insects may not be present in sufficient number at the time of the year to assist in an effective fertilisation, whereas the domesticated insects would be ready on the spot to do the work; and being imbued with a desire to accumulate stores for the maintenance of the extensive family, known as a colony, they would industriously go to work and visit every flower at hand.

Unfortunately, many fruitgrowers still labour under the false impression that bees damage fruit, more particularly grapes. As bees feed only on sweet substances, which they can transform into honey, they have no inclination for the flesh or the juice of fruits. Only when birds have damaged the grapes, and when later, by the wilting of the berries, minute crystals of sugar are formed near the edges of the damaged parts, the bees will frequently be found licking these up. Finding bees busy at damaged grapes no doubt gave rise to the erroneous assertion that they do the damage, as well as being accused of gnawing holes in other kinds of fruit, which, however, is done by several kinds of wasps, and as these are near relatives to the honey bee this kinship may have helped to injure their reputation.

HAIL-PREVENTION.

J.S.W., North Pine.—We shall make it our business to place everything in connection with hail-prevention before our readers, and trust that on Mr. Wragge's return he will have much to say about this matter from actual experience. We were not surprised to receive your letter—in fact, we expected some communication from the lately devastated districts. In this issue you will find an excellent article on "Hail-Prevention." See also Vol. VI., p. 251, and Vol. VIII., p. 21, of this *Journal*, in which articles your questions are fully answered.

COTTON-PICKING MACHINE.

COTTON-GROWER, Ipswich.—Several cotton-picking machines have been devised, but all, so far as we are aware, have been proved to have some radical defect. Lately, however, a machine has been invented by a Mr. W. L. Belt, of Washington City, U.S.A. By this machine, the cotton is extracted from the bolls by air suction, applied through the medium of flexible tubes and fans. The invention is the result of long experience with pneumatic-picking apparatus. When cotton ripens, the bolls open first on the lower branches of the plants. The cotton nearest the ground is most exposed to dust and grit. It is, therefore, desirable to gather such cotton and deposit it in a receptacle separate from the other and cleaner portion. To this end, the inventor claims to have devised a special air suction and blast apparatus to operate on the lower bolls, and other separate apparatus to act on the middle and topmost bolls.

WHAT IS MEANT BY SOILING?

STUDENT.—If you are a student at the Agricultural College, the Principal, Mr. Mahon, could tell you. Soiling means feeding stock in the stable. Instead of letting your cattle graze, you let them, as the boy once said, "Graze in the house." The beasts do not go on the pasture. You cut the feed, and put it in the mangers. By so doing you can keep far more cattle on the farm than if they were allowed to graze out. The object of soiling is to obtain manure in large quantities.

SEPARATED *v.* SKIM MILK.

DAIRYMAN, Esk.—The article you enclosed on separated *v.* skim milk has been referred to Mr. Mahon, at the Queensland Agricultural College, and he says :—

Separated and skim milk come under the same heading—the former being an article from which the cream has been extracted by mechanical means ; the latter by the pan or gravitation process.

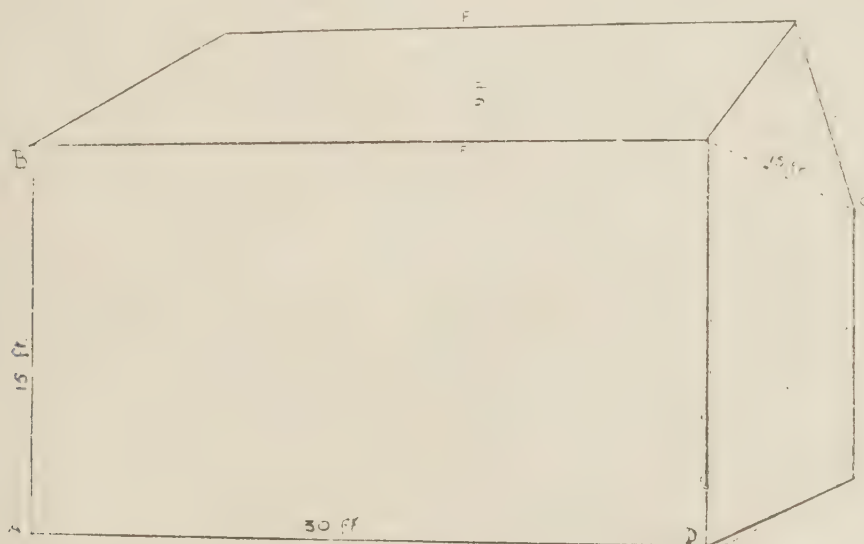
The law, as it stands at present, cannot punish the vendors of separated or skim milk, even if no trace of butter fat is found, because skim or separated milk is an article from which all the fat possible has been extracted.

The amount of fat found in skim milk varies very much, according to the conditions to which the whole milk was subjected during the rising of the cream. It is also true that the different cream separators worked under different methods allow a percentage of cream to escape in the milk.

MEASURES AND MEASURING.

J. WILLIAMSON, Beenleigh.—We have repeatedly given directions for measuring hay-ricks, but, as you say you have not seen our back numbers, we give you the following as an easy way of computing the contents of your stack :—

Measure the height from the ground to the eaves ; add one-third of the height from the eaves to the top ; multiply the result by the breadth and multiply that product by the length. Now you have the content in feet ; 27



MEASURING A STACK.

feet make a cubic yard, so divide by 27. Then divide this by 10, and you will have the content in tons. Make allowance for the compactness of your stack.

The accompanying diagram will show what is meant—

Height from A to B, 15 feet
 Breadth from B to C, 15 feet
 Length from A to D, 30 feet
 Height from E to F, 9 feet.

Now, by the formula—

$$\begin{aligned} 15 + 3 &= 18 \\ 18 \times 15 &= 270 \\ 270 \times 30 &= 8,100 \\ 8,100 \div 27 &= 300 \\ 300 \div 10 &= 30 \end{aligned}$$

The stack contains 30 tons.

The Markets.

AVERAGE TOP PRICES FOR JANUARY.

Article.								JANUARY.		
								Top Prices.		
								£	s.	d.
Bacon	...	...	...	...	...	...	lb.	0	0	8
Bran	...	...	...	...	...	...	ton	5	18	9
Butter, First	...	...	...	...	...	...	lb.	0	1	0 $\frac{1}{4}$
Butter, Second	...	...	...	...	...	...	"	0	0	8 $\frac{1}{2}$
Chaff, Mixed	...	...	...	...	...	...	ton	5	6	3
Chaff, Oaten	...	...	...	...	...	...	"	5	0	0
Chaff, Lucerne	...	...	...	...	...	...	"	6	10	0
Chaff, Wheaten	...	...	...	...	...	...	"	3	12	6
Cheese	...	...	...	...	...	...	lb.	0	0	7 $\frac{1}{2}$
Flour	...	...	...	...	...	...	ton	7	11	3
Hay, Oaten	...	...	...	...	...	...	"	4	1	3
Hay, Lucerne	...	...	...	...	...	...	"	5	6	3
Honey	...	...	...	...	...	...	lb.	0	0	1 $\frac{1}{2}$
Rice, Japan (Bond)	...	...	...	...	...	...	ton	15	0	0
Maize	...	...	...	...	...	...	bush.	0	4	1
Oats	...	...	...	...	...	...	"	0	3	4
Pollard	...	...	...	...	...	...	ton	6	3	9
Potatoes	...	...	...	...	...	...	"	7	10	0
Potatoes, Sweet	...	...	...	...	...	...	"	4	17	6
Pumpkins	...	...	...	...	...	...	"	5	12	6
Sugar, White	...	...	...	...	...	...	"	16	10	0
Sugar, Yellow	...	...	...	...	...	...	"	13	7	6
Sugar, Ration	...	...	...	...	...	...	"	11	5	0
Wheat	...	...	...	...	...	...	bush.	0	2	8 $\frac{3}{4}$
Onions	...	...	...	...	...	...	cwt.	0	7	9 $\frac{3}{4}$
Hams	...	...	...	...	...	...	lb.	0	0	9 $\frac{7}{8}$
Eggs	...	...	...	...	...	...	doz.	0	1	0 $\frac{1}{2}$
Fowls	...	...	...	...	...	...	pair	0	3	2 $\frac{1}{2}$
Geese	...	...	...	...	...	...	"	0	5	0
Ducks, English	...	...	...	...	...	...	"	0	3	6 $\frac{3}{4}$
Ducks, Muscovy	...	...	...	...	...	...	"	0	4	9 $\frac{1}{2}$
Turkeys, Hens	...	...	...	...	...	...	"	0	6	3
Turkeys, Gobblers	...	...	...	...	...	...	"	0	12	1 $\frac{1}{2}$

ENOGGERA SALES.

Article.								JANUARY.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	11	12	6
Cows	...	...	...	...	...	...	...	6	15	7 $\frac{1}{2}$
Wethers, Merino	...	...	...	...	...	...	...	0	13	4 $\frac{1}{2}$
Ewes, Merino	...	...	...	...	...	...	...	0	10	6
Wethers, C.B.	...	...	...	...	...	...	...	0	14	0 $\frac{3}{4}$
Ewes, C.B.	...	...	...	...	...	...	...	0	12	3
Lambs	...	...	...	...	...	...	...	0	11	0
Baconers	...	...	...	...	...	...	...	1	15	9
Porkers	...	...	...	...	...	...	...	1	6	10 $\frac{1}{2}$
Slips	...	...	...	...	...	...	...	0	8	1 $\frac{1}{2}$

Orchard Notes for March.

By ALBERT H. BENSON.

By the end of February the marketing of deciduous fruits is practically finished in Queensland, as, with the exception of a few varieties of late apples in the Stanthorpe district, and of persimmons in the various parts of the colony, this season is over.

The finish of the deciduous fruits, however, marks the commencement of the citrus season, and these fruits will be ready for handling in the earlier districts of the State during the month. This being the case, I take this opportunity of calling the attention of all citrus-growers to the following very important considerations :—

FIRST: *The necessity for preventing this fruit from being destroyed by pests.*

In addition to the various scale insects attacking citrus trees and citrus fruits, the ripening fruit is liable to be destroyed by insects that either suck the fruit, such as the orange-piercing moths described by Mr. Tryon in the April number of this *Journal* for 1898; or by insects boring into the fruit, such as the yellow pearl moth, sometimes known as the corn moth or borer moth, and the fruit fly. In order to obtain a good crop of marketable citrus fruit, these three pests must be carefully looked after, and every possible means must be taken to keep them in check so as to reduce the damage caused by them as much as possible. The orange-piercing moths can be destroyed in large numbers by the use of poisoned baits consisting of well-ripened Cavendish bananas impregnated with a solution of arsenite of soda, or a soluble arsenical poison, such as the well-known white-ant exterminators. These poisoned baits should be hung up among the orange trees, and they will attract and destroy large numbers of the moths. Ripe Cavendish bananas, unpoisoned, also act as an attraction to the moths, and they may be caught by means of an ordinary butterfly-net when sucking the fruit at night. The yellow peach moth, the second of these pests, is much more difficult to deal with, as it is not easily attracted or captured. It lays an egg on the skin of the fruit, usually where two fruits touch, or else in the folds of the skin, near the stem, in fact, in positions where it is not likely to be rubbed off. The egg hatches out into a minute caterpillar, which eats its way into the fruit, and increases in size till it is fully an inch long. Green fruits attacked by this insect rapidly turn yellow, and usually fall off, the loss in some instances being considerable, as the pierced fruit is useless, and rots rapidly. In addition to citrus fruit, this pest attacks peaches, pears, guavas, custard apples, and other fruits, as well as corn, sorghum, peas, beans, cow peas, &c. There are two remedies—first, the destruction of the young caterpillar as soon as it has hatched from the egg and before it has eaten its way into the fruit, and the second remedy is by the gathering and destruction of all fruits and seeds harbouring either the larvæ or pupæ of the insect. The destruction of the young larvæ or caterpillar is accomplished by spraying the infected trees with paris green or arsenate of lime, as described in the October number of this *Journal* for 1900, under the article on citrus culture. The arsenical spray must be put on in the finest possible form so as to completely cover all the fruit on the tree, so that when the young caterpillar starts to eat the skin of the fruit, it will eat a minute quantity of arsenic and be poisoned. This remedy has proved very effectual in the treatment of the codling moth which attacks pomaceous fruits, and there is no reason why it should not be equally efficacious in the case of this insect as well. One spraying will not be sufficient as the moths continue to lay their eggs for a considerable time, so that in districts where this moth is especially destructive to citrus fruits, spraying should be repeated at intervals of not less than three weeks.

The last and by far and away the most destructive insect is the fruit fly. It attacks the orange whilst still quite green, and although the eggs seldom hatch out when laid in the unripe fruit, the injury to the latter caused by the puncture of the ovipositor of the fly tends to a premature ripening of the fruit and to its falling from the tree. Kumquats are especially liable to be attacked by the fly, and often form a very good trap for it, as if the tree is carefully watched and all infested fruit is gathered and destroyed, a large number of larvæ which would otherwise hatch out and destroy a quantity of fruit, would be prevented from so doing. As stated over and over again in these notes and in the articles on fruit culture appearing in this *Journal*, there is no better remedy for the fruit fly than the destruction of infested fruit, and the removal from the citrus orchard of all worthless and unprofitable fruit trees of all kinds which tend to harbour and breed these insects. Systematic and combined effort on the part of all fruit growers to carry out these recommendations will do more to keep this pest in check than anything else, and surely the citrus industry alone is worth taking a little trouble to save, as the quality of the fruit is recognised throughout Australia, and, it is to be hoped, will be shortly recognised in the Home markets as well.

SECOND: *The necessity for the proper handling, grading, and packing of the fruit.*

It is a very common, but sadly erroneous, idea amongst citrus growers, that when the fruit has been grown, all that is necessary is to pull it off the trees, stick it into some sort of a case, and then send it to market. This, I am sorry to say, is the general procedure, and besides being a direct loss to the growers is often the cause of a great deal of friction between the grower and his agent; as, on account of the bad carrying and keeping qualities of such fruit, it is often difficult to dispose of, and the returns are unsatisfactory to both the grower and his agent. In the first place, no citrus fruit of any kind should be pulled from the tree, all must be cut. Secondly, the fruit must be sweated before being packed, as the sweating reduces the percentage of water in the skin, consequently toughening it and rendering it less liable to injury as well as allowing the fruit to be so tightly packed that it will not shift in transit, even when carted over many miles of bad roads. The process of sweating consists of placing the fruit as cut loosely in cases, and allowing the skins of the fruit in such cases to become dried and toughened before it is packed for market.

THIRD.—The fruit must be graded for size and quality, and only one quality of fruit must be packed in a can.

FOURTH.—The Peacock or Shoobridge case, which was accepted as the standard case at the Brisbane Fruit Growers' Conference in 1897, and again at the Melbourne Conference in 1900, for all hard fruits, should be the only case used in which to market the fruit; as it is the only case at present in use in Australia in which it is possible to pack every grade of oranges, so as to have the fruit of even size throughout, and to have the case properly filled. Fruit, packed in this case, carried well to Vancouver, and no difficulty was experienced in packing the various sized fruits.

Strawberry planting can be continued during the month on same lines as recommended in the notes for February.

Where new orchards are to be planted, it is fully time to see about the preparation of the land, if this has not already been done, as it is advisable to get the land well sweetened before planting. Old worn-out trees, and inferior trees that it is desirable to do away with, can be taken out during the month, the holes from which they have been taken being left exposed to the action of the air, so as to be thoroughly sweetened by the time a fresh tree is planted in the same place. Keep the soil well worked, and where weeds have got the upper hand during the previous month mow them down, and turn them under with the plough, a plough having a short digging mouldboard being the best for this purpose.

Farm and Garden Notes for April.

Farm.—Maize should now all be harvested. Gather sorghum seed as it ripens. All the land not yet ready for early wheat should be got in order as soon as possible, as sowings may be made in some localities during this month. The main potato crops sown early in March will now be ready for earthing up. Cut and house tobacco as it comes to maturity. Sow lucerne, and keep thoroughly clean what was sown last month. Sow also oats, barley, rye, vetches, mangolds, and Swede turnips. All vegetable seeds may still be sown.

Kitchen Garden.—Keep the crops clean by continual hoeing, and see that extra beds are well dug and manured ready for transplanting the various vegetables now coming on. Thin out all over-crowded crops. Sow onions, mustard, cress, radish, broad beans, peas, French beans, &c. Earth up celery. Transplant cabbage and cauliflower.

Flower Garden.—Should the month prove wet, planting and transplanting may proceed together. Remove camellias, gardenias, &c. Plant out all soft-wooded plants, such as verbenas, petunias, penstemons, &c. Sow sweet peas, carnations, pansies, mignonette, daisy, snapdragon, dianthus, stock, phlox, candytuft, &c. Plant bulbs as in March. Cut away all dead branches, hoe all borders, and stake any plants that may require it.

Agriculture.

FIELD AND GARDEN REMINDER FOR APRIL.

By HENRY A. TARDENT,

Manager of the Biggenden State Farm.

April is, throughout the Southern part of this State, the principal month for the sowing of wheats, barleys, and other cereals.

In the reminder for March I have explained the best way to prepare the land, and have enumerated the varieties now most in favour with farmers as combining resistance to rust with fair yielding, milling, and other qualities.

Whatever variety is sown, some precautions should be taken to prevent the spread of smut and other similar fungoid diseases, the spores or germs of which are found on the outer surface of the grains.

The means mostly used for that purpose in this State is the dipping of the seeds for a few hours in a solution of bluestone (sulphate of copper) at the rate of 1 lb. of bluestone to 24 gallons of water (more or less).

Others advocate the dipping of the grain in water heated to from 130 to 135 degrees Fahr.

I use neither. I simply spread my wheat on the floor of a barn or shed, or in a large shallow box; then sprinkle it copiously with a whitewash made by dissolving at the rate of about a pint of lime per gallon of water, to which can be added a handful of rock salt. Then I shovel the mass over and over again until every grain is well saturated. In a few hours the wheat is again dry.

That means is thoroughly efficient, simple, inexpensive, and harmless. The little lime and salt adhering to the grains kill any spore of smut, also protect the grains against the attacks of insects in the soil, and act as excellent stimulants and fertilisers, which give a nice dark-green colour to the young shoots of the wheat.

Do not sow too thick. About half-a-bushel to the acre should be the average. A little more perhaps on poor land; a little less on rich soils where the wheat is inclined to stool.

As much as possible, wheats should be sown on a calm day. Should there be a light breeze, do not sow against it but with it—that is, with the wind blowing at your back.

Usually sowing is done on the furrows, in which case the cross-harrowing covers nearly every seed. If sowing is done on already harrowed land it should be followed by repeated harrowings and cross-harrowings, otherwise many seeds will be left uncovered.

Where drought is the enemy to contend against, it is not at all a bad plan to sow on harrowed land, and then plough in the crops about 3 inches deep.

I have often been asked whether wheat should be rolled or not. It all depends on the soil and weather. On light sandy soils and loams it is nearly always advisable to roll. On sticky land rolling should be done with extreme caution, and only when the land is dry. Otherwise it will cake, and the whole field take the appearance of a huge brick. True, such a drawback can be to a certain extent averted by harrowing again after rolling.

When the wheat is about 6 inches high, and the land is not wet, it should be gone over with light harrows, such as, for instance, the Reversible Lever Ajax, with the teeth slightly bent backwards. I venture to recommend such harrowing not only for cereals, but for maize, potatoes, cow peas, carrots, turnips, &c. Do not be frightened by the slightly shabby appearance of the field after the passage of the harrows. It will do the field as much good as a

thorough grooming to a horse. In a couple of days the crop will revive, and resume growing with a renewed vigour and energy. I know many people are afraid to use the harrow in this way. To those I would say: It is always well to unite caution with progress. So try it first on a small scale along one of the sides of your fields—just to see.

Should the autumn and winter prove mild, and the wheat make in consequence more headway than is desirable to have before the advent of frosts, it should be kept in check by running mobs of sheep on it. This will be found extremely beneficial to the crop. Those sheep act as an improved roller which makes the ground gently firm round the roots, and at the same time they act as perfect manure producing and distributing machines.

No wheat farm should be without a flock of sheep. They will ask very little to keep. In the autumn they will thrive on the young wheat, and after the harvest they will get rolling fat on the stubble and weeds.

During this month and the next some of the maize sown in November and December will be ready for harvesting—at least, in those favoured places where the crop has had enough moisture to ripen.

Pioneering beginners have to do, of course, the best they can with hand labour; but, as soon as means will allow it, they should provide for harvesting maize by improved implements similar to those now in use for wheats. The stalks should be cut and tied in sheaves by means of the Osbourne Columbia corn-harvester, and then stooked and cured in the field. In the absence of a corn-harvester, use the very simple and inexpensive corncutter described and illustrated in Vol. III., p. 415 (1898), of the *Journal*.

When the stalks are well dried, pass them—stalks, cobs, husks, and all—through the machine now largely used in America, and called a *cornshredder*. The cornshredder delivers on one side the grains shelled, sorted, and winnowed; whilst on the other side it delivers the stalks, husks, and leaves under the form of a well-carded mass, which wants only to be mixed with some lucerne or cowpea chaff to form an excellent fodder for both cattle and horses.

Even in the absence of the shredder, cornstalks should not be wasted, as is generally done now in this State. During the winter months, when natural grasses are scarce and dry, cattle and horses will greatly appreciate a bundle twice a day.

I strongly advise farmers to devise some means for grading their corn as well as their potatoes, fruits, and other crops. (See the very simple and effective way I do it here on the farm—*Agricultural Journal*, Vol. VI., p. 460.) They will get more money for the reduced graded grains than they would for the whole lot mixed. They will also have always selected seeds, which will greatly contribute to the success of the next crop. As to the small grains, keep them on the farm, where they are as good as large ones to turn into equine muscular energy, bacon, and eggs.

When the weather is favourable, this is a good month to sow lucerne and other grasses, and to transplant rooted plants of *Paspalum dilatatum*. For the preparation of the land and *modus operandi*, see last month's reminder. This is also a good month for all sorts of autumn and winter vegetables. Therefore take every opportunity of continuing to sow in succession and to transplant, as the case may be, cabbages, cauliflowers, brocoli, kohl-rabi, savoys, swedes, leeks, mangel wurzels, turnips, carrots, parsnips, radishes, lettuces, &c. Sow also broad beans in well-worked clayey soil. Where seasonal rains have come late, weeds will grow extremely quickly, as the ground is still warm. Never allow them to take hold of the land and run to seed. As soon as the land will allow it, use the scarifier, spring-tooth harrow, and any other of the many implements now on the market for cleaning and pulverising the land.

[In Mr. Tardent's "reminder" for March, an obvious error occurs. In his second paragraph the word "frost" has been printed instead of the word "moisture" as written. The substitution of one word for the other makes a wide difference in the sense.—Ed. *Q.A.J.*]

CO-OPERATION IN DENMARK AND FRANCE.

Dr. Cobb, of the New South Wales Department of Agriculture, who has just returned from a lengthy tour in the United States and Europe, says concerning the people of Denmark and France:—"It is wonderful what the people of Denmark and France accomplished by co-operation. They are of a different class to our people, and have been driven to co-operation by dire necessity. Our farmers need not starve if they do not co-operate. The co-operative enterprise in Denmark reminds me of army discipline. They keep step like soldiers, and, subordinating everything to the benefit of the association, are accomplishing wonders. They are making good money. An impression prevails that the success of Danish produce in the English markets is due to Government assistance. I was under that impression until I went there. I find it is not the case. Neither is it due to superior methods in the dairy. I do not think their dairies are cleaner than those of Great Britain or America. Their success is not due so much to these things as it is to co-operation."

GOATS IN SOUTH AFRICA.

Mr. James Cassidy, writing in the *Windsor Magazine* on the wool industry of South Africa, introduces the subject of the Angora goat, an animal found upon almost all sheep farms. When, he says, the Europeans first visited South Africa, they found sheep in the parts occupied by the Hottentots and goats in parts inhabited by the Bantu. The native goat was a coarse animal not unlike an English goat, but larger, thinner, and stronger. The flesh was used, as it is now, for meat; and the skin, then as now, was reckoned of great value on account of its toughness. It had nothing else of commercial value but its meat and skin. Within the last half-century, the long-haired goat, usually called the Angora, has been introduced from Western Asia. The Angora is a smaller animal than the native goat, but fuller in body, and produces a long and fine hair, very valuable to manufacturers. It is, like the imported sheep, a much more delicate animal and more subject to disease than the native animal, but it is found to answer as well in some parts. It does pretty well in the same districts as the sheep, Somerset East and the adjoining districts being great goat-farming places. As there are two distinct races of sheep in the colony, so there are two distinct races of goats—the common or native goat, and the Angora or Asiatic goat.

Mr. D. Hutcheon, of South Africa, an acknowledged authority, says:—"The common goats are very hardy animals, grow to a large size, and multiply very rapidly; hence they are about the most profitable stock which a farmer can raise in districts where there is a demand for their mutton. . . . Great difficulties attended the introduction of the fine-haired varieties of Angora goats into the colony. There are, to-day, three distinct types or varieties of Angora goats in the colony. The first is a small animal with a moderate weight of fleece. This is distinguished as the fine, lustrous, silky-fleeced goat, and produces the most valuable hair. The second variety is a larger animal with a very heavy fleece and strong, heavy hair; the third variety is the oily goat, so-called on account of a sebaceous secretion from its skin, which, on the hair, presents a greasy appearance. The Angora goat of the colony has beautiful white hair and small horns. It is a very aristocratic-looking creature, and very unlike any goat that can be seen in this country. During the thirty-five years that Angora goat-farming has been established, the extension of the industry has been satisfactory. According to the last census returns, there are now over three millions of Angora goats in the colony, but only a comparatively small number of them are of pure descent, the majority being the progeny of common native goats and purebred Angoras."

The Official Handbook of South Africa, published at Cape Town and Johannesburg, calls attention to the fact that, "although the colony has made good

strides in the production of the raw material, it has done little towards turning its wool into use for wearing apparel. The value of the Angora goat to an arid region is shown by the fact that, during a prolonged drought in some of the dry Karoo districts, they are often the only kind of stock in a condition fit for the butcher."

If this animal had been introduced into the Western country of Queensland, the late terrible drought would have severely tested them, and would have proved satisfactorily their fitness or otherwise for stocking country on which so many thousands of sheep have lately perished.

HAY LOADERS.

The *Mark Lane Express* gives a description of the Ohio hay loader, a machine manufactured by the Ohio Rake Company, Dayton, U.S.A., and introduced into Great Britain by Messrs. F. C. Southwell and Co., of 75 Southwark street, London, S.E. This machine has gained very wide popularity as a labour-saver, not only abroad, but in England, as will be seen from the following, several of many testimonials given of its success:—

Messrs. William Haine and Sons, Poulenot Manor Farm, Devizes, Wilts, write:—"We have given the 'Ohio' hay loader a good trial on uneven as well as level ground, having made about 150 acres of hay this season, and loaded the greater part of it with that implement. The crop was very heavy, and we are really thankful for the wonderful invention. It is no doubt far superior to other makes we have seen at work, and will pick up a heavy crop clean from swath equally as well as a light crop when raked into windrow. A much lighter load can be put up than with other makes, and one man can load on the wagon. Wherever the wagon can turn, the 'Ohio' can follow without being put out of gear to prevent breakage, thereby cleaning and clearing the ground wherever it goes. There is very little raking indeed left. Loads do not really require tying on going a considerable distance to the home yards, and we unload very easily into the elevator. These are a few of the many good points in favour of the 'Ohio.' Some of our friends say they would rather buy this machine than have any other they have seen given them. We consider it saved the cost the first season, as we hired no extra labour, milkers doing all the hay-making," &c.

Mr. John Fry, Sutton Benger, Chippenham, Wilts, says: "I have this day tried the Ohio hay loader, purchased of your local agents, R. S. Hulands and Sons, Yatton Keynell, and I must say I am perfectly astonished and pleased with the work it does in picking up the hay out of swath. I consider this to be one of the best labour-saving machines yet introduced into the hayfield. I am quite satisfied with my purchase, and have pleasure in giving you this testimonial, and wish you every success with your good implement."

Mr. Wm. Fenemore, Moat Farm, Wotton, Aylesbury, writes: "I have used the Ohio hay loader, and think that it will be a great saver of labour, and that it picks the hay up clean, pushing it up on to the load so that one man can load it."

The above testimonials speak eloquently in favour of the "Ohio" hay loader, but it may be added that the machine is so well balanced that one man without assistance can instantaneously couple it up to the axle of a wagon or cart, and as quickly uncouple it. There are other machines which require two or more men to do this with safety to themselves and the machine. In an average crop, a boy to lead the horses, one man on the load, and one man on the horse rake to clean up the field where necessary, are sufficient to carry the entire hay crop of a farm, the horses in the cart travelling at a suitable pace, and where two men are on the load the horses can travel at a quicker rate, when a ton of hay can then be handled in less than ten minutes. The width of the machine has been reduced to use seven forks instead of eight as formerly, so

that it will now rake 7 feet wide at the bottom (the top being contracted to 6 feet), and the overall width of the axle is not too large for ordinary gateways. No better labour-saving appliance for the hayfield has ever been invented, and there will doubtless be hundreds of them sold in the coming season. This machine was thoroughly tested last harvest in this country, and everyone says it is infinitely superior to anything of the kind they have ever seen before ; it is therefore in no sense an experiment.

BEER BREWED FROM OATS.

There are* several brewing firms in the United Kingdom who make a speciality of the production of beers from a proportion of oats. This has particular reference to malted oats, and a writer in the *Brewers' Gazette* has no hesitation in saying that they form an excellent grain for improving the palatableness of all beers which are likely to be given quick consumption. In making a comparison of the constituents of oats and barley, it may be pointed out that, while the former contain about 14 per cent. of water, 56 per cent. starch, 4·6 per cent. fat, 1 per cent. cellulose, 5·7 per cent. sugar, 16 per cent. albuminoids, and 2·5 per cent. ash, &c., barley contains about 12 per cent. water, 52 per cent. starch, 2·6 per cent. fat, 11·5 per cent. cellulose, 4·2 per cent. sugar, 13·2 per cent. albuminoids, and 3·8 per cent. ash, &c. The chief difference between the two kinds of grain is in the cellulose and albuminoids. It will be noticed that oats contain more albuminous matter than barley, while the latter contains more cellulose than oats. It is the peculiarity and amount of the albuminoids of oats which cause this grain to impart such a rich palatableness to beers, while the grain also produces a characteristic flavour of its own, which, unless too pronounced, meets with great favour. Now that material for the production of light beers must of necessity contain a diminutive quantity of albuminous matter, the use of a certain percentage of oats will altogether improve the flavour of such beers, and, if mashed correctly, exert a stimulative action upon yeast reproduction during the fermentation process. The question of employing oats as a brewing material is by no means new ; and where heavy percentages of raw grain, or even flaked maize or rice, are employed, a portion of the total grain should be of oats, as not only do they assist drainage but prevent that extreme thin palate flavour so characteristic of beers that are produced to any extent by the aid of cereals deficient in albuminous matter. Practical brewers know only too well that to produce sound beers the amount of albumen in them must be extremely limited, and, because this has been advocated so persistently, modern brewers have gone to the other extreme, with the consequence that the stability and vigour of the store yeast have suffered. This may be prevented by the judicious employment of oats, and, if carefully handled, they make excellent brewing material : while not yielding a high extract, they make up for this by imparting a greater palatableness than even malt barley.—*Agricultural Gazette*, London.

STEEPING WHEAT FOR BUNT.

In the report for 1900 of the experiments of the Cheshire County Council, carried out at Holmes Chapel, there is an interesting experiment reported, the object of which was to determine whether steeping wheat in copper sulphate solution would effect a cure for bunt. A sample of wheat was procured containing a large percentage of grains affected, and as much as would sow one-tenth of an acre was steeped in a solution consisting of 1 lb. of copper sulphate dissolved in a gallon of water, which is enough to steep 4 bushels of wheat. After harvesting, the number of heads examined, from the plot on which the pickled seed was grown, was 6,000 in number, none being diseased, and no

bunted heads found. A comparative acreage was also sown when undressed bunted grain was used, and 3,000 heads examined after harvesting showed that 4.60 per cent. was diseased. The trial, therefore, seemed fairly successful. The grain should be spread out on a smooth floor, and the solution poured over it. It should then be turned over once or twice with a shovel, and left spread out thinly, until sufficiently dried to sow.

THE McCORMICK AUTO-MOWER.

Mechanical and engineering sciences, which have of late years caused a revolution in farming operations, are still actively engaged in reducing the toil of the farm labourer, expediting the work of the field and of harvesting and marketing farm produce. The latest invention in locomotion, the motor car, has now been applied to agricultural operations. The celebrated agricultural implement makers, the McCormick Harvesting Machine Company, have devised an engine which can be utilised for cultivating, mowing, sowing, reaping, and, as it is detachable, for all operations on the farm requiring horse, man, or engine power. This is the auto-mower, a machine which was exhibited at the Paris Exhibition. It is driven by means of a two-cylinder vertical motor, the cranks running in a case forming part of the bed plate, which is bolted to the frame of the mower. All parts are protected from dust by being enclosed. On a bar running from the right side of the mower, and ending in a steering wheel, which runs in the track of the driving wheel, rests the tank containing water for cooling the motor, the dry battery, and a supply of about 8 gallons of petroleum spirit for fuel. The water circulates in the cylinder jackets by heat gravitation, and the speed regulates the running rate, the driver doing this by means of a lever at his side. When tried in France the auto-mower gave great satisfaction, the judges complimenting the firm upon its excellent work in cutting two acres of grass in an hour and twenty minutes. The machine is very compact and workmanlike, and we look forward with interest to the evolutions of the motor as applied to estate and farm work.

ARTIFICIAL MANURES—A WARNING.

Writing to *Planting Opinion* on the subject of arsenic in beer, a correspondent says:—The recent discovery of arsenic in considerable quantities in beer has been traced to the substitution for malt in the process of brewing of glucose or invert sugar prepared with impure sulphuric acid, made from arsenical pyrites.

This was succeeded by the alarming announcement that the Manchester analyst has found arsenic in about equal quantity in beer brewed from hops and malt alone.

The *Lancet* follows this up with the statement that the base of most artificial manures—viz., superphosphate of lime, made by acting on bone ash with common oil of vitriol—is rich in easily soluble arsenic, which has been proved to be readily taken up from the soil by plants to which this arsenical manure has been applied; and it is suggested that, as arsenic accumulates in a soil which is being constantly dressed with superphosphates, its presence in malt may arise from this cause.

It is, therefore, necessary that planters should be on their guard against the possible risks from the use of superphosphate, which forms a chief ingredient of certain advertised fertilisers; it is advisable, also, that the presence of the same contamination in other chemical manures—*e.g.*, basic slag, ammonium sulphate, &c.—should be sought for.

Indian coffee cannot afford to incur the suspicion of being grown with the aid of arsenicated manures.

Dr. F. W. Kœller, of Kandy, writes to the *Tropical Agriculturist* (Ceylon) on the subject of artificial manures poisoning vegetables:—With reference to your extract in *Ceylon Observer*, 21st January, entitled, "Suggested Danger from Artificial Manures," I beg to inform you that cabbages and turnips manured with superphosphates are surely poisonous; and I estimate the quantity of cabbages or turnips which should empoison a man to be at least *one ton* daily.

AUSTRALIAN AGRICULTURE. THROUGH AMERICAN EYES.

There is no doubt that from an agricultural point of view Australia and America are being more closely drawn together every year. The methods of farming which have been extensively adopted in recent years on this side of the world—and no more widely than in South Australia—assist this movement. Australian millers are being brought into more frequent competition with those of the States in the markets of the Far East, and altogether there is a disposition on the part of the two countries to come into closer relation. So far, however, as South Australia is concerned, trade is not nearly so mutual as it should be. This State, in 1899, took from America £12,000 worth of agricultural implements, but was not able to directly dispose of a single bale of wool to the States, and the whole trade balance was greatly in favour of America. To the American these lands are regarded, in the first place, as a market for his goods, and as a customer he has some complimentary things to say of Australians. A New York merchant who returned from a tour around the world in December expressed himself before a leading New York association as follows:—"The most striking thing in England to-day is the strong friendship among all classes for this country. This is most gratifying, and should be cultivated. These remarks apply generally to the English-speaking people everywhere, and especially to Australasia. While the population is only 5,000,000, the Australians are among the richest per capita of any people in the world. They are liberal buyers of high-quality goods; they are fine merchants, and very favourable to America. This trade has assumed large proportions, our shipments having increased threefold in nine years, and is capable of much greater development."

This opinion is shared by another American gentleman who is now on his way back to the States after a tour of Australia. Mr. F. R. Packham, who represents the Superior Drill Company, of Springfield, Ohio, has just concluded a visit to South Australia. He has travelled extensively all over the world, but this was the first time that he had been to Australia, and he returns with high opinions of the country and of its agriculturists, with whom he was more particularly brought into contact. Mr. Packham is a typical, breezy, Yankee business man, and in conversation with a reporter he remarked:—"My object in coming here was to ascertain if possible more fully the requirements of your farmers. I am going direct from here to Russia with the same object in view. I want to get into the wheat-growing country, and find out for myself why American implements do not seem to be adopted. Russia is inclined to encourage agriculture, and lately has taken off the heavy duties on machinery, so that there should be some prospect of outside countries doing business."

"What opinion have you formed of Australian farmers?"—"I cannot help saying that I found them far above the average of other countries in intelligence. Of course, we in America have some first-class men, but the emigrant factor is prominent. Your Australian farmer knows what he wants, and is reasonable in his demands. At the demonstrations I held in the country they came in large numbers on horseback or in wagons, and I felt that they knew what they were talking about. I have been especially interested in the manner in which you put up hay in this country. We depend upon Timothy and natural grasses for feed, while here it seems you have adopted

an entirely different plan. This is a matter I think we shall look into. I hold a commission from the American Government to inquire into agricultural matters in the countries I visit, and this subject of fodder is one I shall report on."

"I am very favourably impressed with your country, and think it has a bright future. Provide good laws for the farmers, and encourage your export trade. I must confess I am surprised you are not supplying everything that is required in connection with the war in South Africa. You have advantages in that market which we in America do not possess. I have noticed that your farmers are placed at some disadvantage in the method adopted of handling their wheat after harvest. Bagging certainly adds to the cost, and I think the day is not far distant when you will adopt the bulk system. I have noticed the report of the Victorian Railway Commissioner on the subject, but I think he made a mistake in going only to the large American centres. If he had visited other parts of the country he would have found the bulk system being carried out on a much smaller and less expensive scale. It is not necessary that the elevators should be expensive, and your present railway trucks would be suitable for the work. I feel sure our system will be adopted—certainly as soon as you begin to produce larger quantities of wheat. You must use manure in this country, and mix it with brains. A mistake is made if too much or too little is used. When you do get rain here you can produce wheat cheaper than we in America. For one thing our ploughing has to be done much deeper than here."

HEMP AS A MONEY CROP.

This from the *American Agriculturist* may interest some of our readers:—The Department of Agriculture at Washington has conducted the past season, under the supervision of the division of botany, experiments in hemp cultivation on its trial grounds at Washington and in several localities in the Carolinas. No official statements have been published relative to these experiments, but it is understood there is the possibility of widely extending this industry. In Ky. a considerable area of hemp has been grown annually for many years. This hemp differs quite distinctly from the product of the Philippines, which comes from a tree resembling the banana in its characteristics; Ky hemp is in the nature of a plant, and the experiments conducted by the Department of Agriculture show in some instances a growth of 10 to 12 feet. The imports for the fiscal year 1900 of all coarse fibres for manufacturing bagging, rope, twine, &c., amount to \$24,000,000 (£4,800,000).

A NEW REMEDY FOR POTATO SCAB.

It has recently been concluded that an alkaline condition of the soil promotes scab in potatoes, while acidity tends to prevent it. In the last three years at the Rhode Island Experiment Station it has been shown that scab is checked by applying any material that develops acidity, while it is induced by anything which, like lime, sweetens it. One grower states that he has successfully treated scab-infested soil by ploughing in a crop of green rye before planting potatoes.

A STEP FORWARD.

The *Tropical Agriculturist*, Ceylon, says that the closing of the School of Agriculture has been ordered by Government, and, as a tentative measure, agricultural work will be carried on through rural schools with connected school gardens. The Superintendent of the School of Agriculture will assume the duties of Superintendent of School Gardens. We are convinced that good results should follow this new departure, and we notice the Ceylon Press is of the same opinion.



Cretan.

Brown Eared Mummy.

Egyptian. C1.

The *Agriculturist* has persistently advocated the teaching of agriculture in rural schools, and in its February issue reprints a long article on the subject from this *Journal*. We shall watch with much interest the results of the new departure, in the hope that the same work may in some form be undertaken by our own Education Department.

WHEATS SUITABLE FOR QUEENSLAND.

BY W. SOUTTER, Inspector of State Farms.

The rapid development of wheat-growing in Queensland during the past few years demands the necessity for looking around for improved varieties of wheat, and such kinds as are best suited for the soil and climatic conditions obtaining in our wide wheat-growing area, which extends from the southern border to the table-land in the vicinity of Herberton. In such a wide range of latitude, it may be assumed that the same variety of wheat will grow with varying success. It is, therefore, the object of the Department of Agriculture to secure for these varying conditions a suitable wheat, and, with this closely in view, the State farms have been made the medium of these experiments. Out of upwards of 400 varieties of wheat grown on these farms three years ago, it has been found that out of this number only about eighty sorts have been retained as suited for our varying climate. Chief among these are those known as Marshall's No. 3 and Marshall's No. 8, both of which have proved themselves both hardy and prolific alike on the Eastern Downs, south, to the Central division, north. The lack of an experiment station in the Far North prevents a record of any value being made, although there is every reason to believe, from experiments made at Gindie (Emerald), that Marshall's wheats may be successfully grown in the highlands of North Queensland. There are a few of the older wheats grown on the Downs which, in average seasons, give fair results, but extreme droughts or wet seasons act somewhat disastrously, by extreme pinching of the grain during the former and the rust during the latter. The aim being to secure hardy wheats, attention has been turned to hybrids. Of these wheat-growers are indebted to the efforts of Mr. Farrar, of New South Wales, who, in the direction of raising crossbreeds in wheat, has done good work.

And in Queensland, the State farms are testing these hybrids with a view of securing such of these as are found suited to the conditions obtaining here. Several have been discarded as quite useless, while numbers of those retained give promise of becoming valuable additions to our cereals.

The accompanying photographs and letterpress will give some idea of the habit of growth and general characteristics of both a few of the old varieties and the hybrids referred to.

CRETAN—

Straw, 4 feet; long-jointed, tapering, coarse, dull yellow, medium hard, moderate flag.
 Ear, 4 inches; close set, well filled; beard 4 inches long, white, chaff yellow.
 Grain, long, red, flinty. Mid season. A good macaroni wheat.

BROWN-EARED MUMMY—

Straw, 4 feet; coarse and rather hard, short-jointed, tapering, nodes prominent.
 Ear, 4 inches; close set, heterogenous, 1 inch wide, well filled; beard $3\frac{1}{2}$ inches, brown coloured, chaff white.
 Grain, small, red, hard. Mid season. A prolific yielder.

EGYPTIAN C1—

Straw, 4 feet ; long-jointed, coarse, tapering, hard, rather flaggy.

Ear, 4 inches ; close set, well filled, terminals well developed ; beard 5 inches long, tinted brown, chaff yellow.

Grain, large, oval, hard. Mid season.

WHITE-EARED BARLEY—

Straw, 3 feet 10 inches ; medium hard, flaggy, rather coarse, dull yellow, thin at base of ear.

Ear, 4 inches ; close set, heterogenous, well filled ; beard 5 inches long, silvery white, chaff white.

Grain, small and plump.

POLAND—

Straw, 4 feet ; long-jointed, hard, coarse, flag up to top joint.

Ear, 6 inches to 7 inches, loose set, does not fill well ; beard about 4 inches long, usually falling off when the ear is ripe.

Grain, very coarse and large. Mid season.

MISSOGEN—

Straw, 3 feet 9 inches ; short-jointed, hard, rather coarse, stout at base of ear, dull white colour.

Ear, very close set, flat, well filled ; beard 5 inches long, silvery white, shaded brown, chaff yellow.

Grain, small and thin. Mid season.

BUDD'S EARLY—

Straw, 3 feet 6 inches ; long-jointed, soft, clean, tapering, reddish tinted.

Ear, 4 inches ; close set, tapering, well filled, red chaff, small awns on terminals.

Grain, clear-skinned, plump berry. Early. This wheat has come greatly into favour of late years, and it does well on sandy land.

STEINWEDEL—

Straw, 3 feet ; long-jointed, thick, soft, white, flag persistent, rather liable to rust in damp seasons.

Ear, $3\frac{1}{2}$ inches ; open set, well filled, white chaff, small awns on terminals.

Grain, short and plump, clean skin. Mid season.

ZEALAND—

Straw, 3 feet ; slender, tough, long-jointed, purple tinted, nearly free from rust, very little flag.

Ear, $4\frac{1}{2}$ inches ; open set, round, well filled, except the terminals, chaff silvery-white.

Grain, clear-skinned and plump. Mid season.

BBB—

Straw, 3 feet 10 inches ; short-jointed, brittle, inclined to be coarse, a good deal of flag at the base, thick below the ear.

Ear, $4\frac{1}{2}$ inches ; loose set, well filled, bald at the base, short awns on terminals, chaff yellow.

Grain, deep, well-formed berry, bright-skinned. Early. A hybrid of Farrar's, a very promising wheat.

84 C1D—

Straw, 3 feet 10 inches ; slender, short-jointed, soft and tough, tapering at top, rather flaggy, dull yellow.

Ear, $4\frac{1}{2}$ inches ; open set, round, well filled, bald, chaff white.

Grain, short plump berry. Early. A very nice clean-looking wheat, a hybrid of Farrar's.



White Eared
Mummy.

Poland.

Miasogen.



Budds Early. Steinwedel. Zealand. B.B.B. 84.C.I.D. 85.A.B



Battlefield.

Armstrongs
Selected.

Allora
Spring.

White
Lammas.

Early Para.

White
Essex.



Indian
D.

Farmers
Friend.

Rattling
Jack.

Steers
Early.R.R.

Blount.

Marshall's
No 3.

Marshall's
No 8.

Yandilla
Imp. Ind.

85 AB—

Straw, 3 feet ; slender, long-jointed, soft and tough, very little flag, white, rust resisting.

Ear, 4 inches ; open set, well filled, inclined to flat, bald, chaff white.

Grain, round plump berry. Early. A hybrid of Farrar's, likely to prove good.

BATTLEFIELD—

Straw, 3 feet ; slender, straight, short-jointed, medium hard, fairly free from rust, not much flag.

Ear, 4 inches ; open set ; denser near top, well filled, short awns on terminals, chaff yellow.

Grain, fine bold berry, dull skin. Mid season. This wheat does not do well on black soil.

ARMSTRONG'S SELECTED—

Straw, 3 feet 3 inches ; long-jointed, soft, tapering, slightly coarse flaggy at base.

Ear, close set, tapering, well filled, red chaff, slight awns on terminals.

Grain, short, square end, plump, soft. Early. This is evidently a sport of Allora Spring. It was selected by Mr. Armstrong, of Warwick, about three years ago, who found it as a chance seedling among his wheat.

ALLORA SPRING—

Straw, 3 feet 3 inches ; short-jointed and crooked at the base, soft, tough, medium, coarse.

Ear, 4 inches ; open set, well filled, chaff brown, short awns on terminals.

Grain, round plump berry. One of the earliest of all our wheats ; for many years this was considered as the only wheat that could be profitably grown on the Downs. Although it is a heavy cropper, it sheds a lot of grain when handling the crop in the harvest field.

WHITE LAMMAS—

Straw, slender, long-jointed, flaggy, poor.

Ear, open set, badly filled, tapering, slight awns on terminals, chaff white.

Grain, small poor berry. Late. This wheat is much too late for the Downs country. It is also very liable to rust during moist seasons.

EARLY PARA—

Straw, 3 feet ; slender, long-jointed, clean, no flag, rust seldom affects it.

Ear, 4 inches ; close set, tapering, well filled, bald, white chaff.

Grain, fine filled berry, clean skin, soft. Early. On sandy or light soil country, this wheat does remarkably well ; being early, it is liable to be cut down by the late frosts.

WHITE ESSEX—

Straw, 2 feet 6 inches ; very slender, soft, clean, tapering, sometimes rusty.

Ear, 3 inches ; loose set, tapering, badly filled, bald, chaff white.

Grain, small white berry, poor. This wheat is too late for the Downs.

INDIAN D.—

Straw, 2 feet 6 inches ; slender, clean, soft, long-jointed, free of flag, silvery-white, seldom gets rust.

Ear, 2½ inches ; close set, well filled, compact, clubbed, bald.

Grain, small, round. Early.

FARMER'S FRIEND—

Straw, 2 feet 6 inches ; thick, hard, flaggy, liable to rust.

Ear, $3\frac{1}{2}$ inches ; close set, thick, inclined to be square, well filled, white chaff, small awns on terminals.

Grain, round, small white berry. Mid season.

RATTLING JACK—

Straw, 2 feet 9 inches ; straight, long-jointed, soft, tough, tapering, flaggy at base.

Ear, compact ; close set, clubbed, chaff white, small awns on terminals.

Grain, a fine, round, plump berry. Mid season. Does well on sandy soil, but is too late on black soil country.

STEER'S EARLY R.R.--

Straw, 3 feet ; slender, straight, hard, tapering, very little flag, resists rust best of all the purple straws.

Ear, $2\frac{1}{2}$ inches ; dense, compact, well filled, chaff white, small awns on terminals.

Grain, short plump berry. Late. Not suited for black soil country.

THE BLOUNT—

Straw, 2 feet 6 inches ; slender, straight, long-jointed, flaggy, and very liable to rust in damp weather.

Ear, 3 inches ; close set, well filled, slightly clubbed, chaff white, short awns on terminals.

Grain, fine plump white berry. Late. Succeeds best on light lands.

MARSHALL'S No. 3.—

Straw, 3 feet 6 inches ; very pretty, slender, white, long-jointed, medium hard, tapering, free from flag, and almost rust-proof.

Ear, close set, tapering, well filled, chaff white, slight awns on terminals.

Grain, a fine plump berry, possessing good milling qualities. Early. This wheat is becoming a favourite with the farmers of Queensland. It is a sure cropper, stands dry weather well, and is suited to the soil conditions of most of the Darling Downs. It stood the frost of last spring better than any of the other varieties. It can also be allowed to stand in the field till dead ripe, without fear of shedding. The average yield per acre last year was 20 bushels.

MARSHALL'S No. 8.—

Straw, 3 feet 6 inches ; slender, long-jointed, medium hard, clean, free from flag, white, not liable to rust.

Ear, tapering, close set, well filled, brown chaff, bald.

Grain, medium-sized berry. A good milling grain. Early. Like No. 3, this wheat is likely to become a favourite with the farmer.

YANDILLA IMPROVED INDIAN—

Straw, 3 feet 6 inches ; long-jointed, inclined to coarse, hard, yellow, flag persistent at base.

Ear, close set, well filled, inclined to square, bald, chaff white, takes rust in wet weather.

Grain, short round plump berry. Mid season. This is a wheat of some promise, and should do well on light soils.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

1ST LESSON.

BY A.J.B.

In the following articles I propose to explain in simple language, suitable to the minds of young boys and girls in the country, the elementary principles and practice of agriculture.

In the absence of any easy text-book on agriculture in the State schools of Queensland, these lessons may be found of some use in interesting young people in an industry which must always take first place amongst those of all countries under the sun. It is hard to say what would become of the world and its other industries if agriculture were abandoned.

You have all heard the word "agriculture," and you know that it has something to do with farming. Well, the word agriculture means cultivating a field. But how the field is cultivated, and how the farmers make the beautiful crops of wheat and lucerne and potatoes and other things grow and produce fruit, you do not yet know. You see a man ploughing a field. Why is he ploughing it? That is what I am now going to explain to you. You know the corn and wheat and green stuff for horse feed and vegetables are grown in the soil. But if you were to try and grow these things in the same way as the grass in the bush grows, you would find that your crop would not come to anything. Why is this? You will say that the grass and weeds grow without any ploughing. Their seeds drop on the ground and they grow; why should not potatoes and corn grow just as well? The reason is, that corn and potatoes require a loose soil. And why loose? Because the plants and their roots require air and water, and they can only get air and water when the soil is soft, so that the roots can easily run through it and get the nourishment they require. This nourishment is called plant food. The air can get into a loose soil, and the moisture can rise through it and be sucked up into the plants. Now look at that man ploughing. If you follow him you will see that his plough has stirred up the soil for several inches from the surface. He has thus made a loose bed through which, when he has sown the seed, the little rootlets can easily make their way and draw up all the moisture they need to enable them to grow up vigorous plants. But ploughing alone is not sufficient. Look at the sod the ploughman has turned over. It is like a long cake, scarcely broken. If the seeds were to be sown after he has finished ploughing, they would not grow properly. So the next thing he does is to drag a wooden or iron frame full of long teeth across the ground. This is a harrow, and it does for the field what a garden rake does for a flower garden when it has been dug over. It smooths down and breaks up the clods, and renders the soil soft and friable, and puts it in a proper condition to receive the seeds.

When the field is ploughed and harrowed it becomes a sort of soft sponge. You have seen the rain falling on hard ground. What becomes of the water? It runs off over the hard soil into some creek or gully or low place on the land, and very little goes into the soil. That little is quite sufficient for the grass whose roots are near the surface, but would not be of much use to plants whose roots go deeper into the soil. So you see that ploughing is necessary to enable the rain water to reach the lowest roots. Now I must tell you something else about the rain water. After a heavy shower of rain you will notice that often a strong westerly wind sets in. Now, a strong wind will dry up the ground more rapidly than a hot sun; and if Nature had not done something to help the poor plants to get the moisture they want, they would all die.

Now I will show you how they get this moisture. Here is a bit of lump sugar. It is quite dry, you see. I dip one end of it into this saucer of water.

Now examine the sugar. You see that it is quite wet. Even the dry part I held in my hand is wet. How does this happen? The sugar is full of little passages through which the water creeps up until these passages are all full, and the whole lump is full of water. Just in the same way the soil, after it has been ploughed and harrowed, is full of little passages through which the rain water which lies below the soft soil creeps up and supplies the roots with all they require until another shower falls. When dry weather lasts for a long time the supply of water below the surface becomes exhausted at last, and the poor plants, which cannot live without water, become sickly, and at last die off. But a good farmer is always stirring up the soil between the crops, and by doing this he provides more plant food for them, and the moisture does not pass away so quickly as if he left the soil to itself. Then there is another reason for knocking the soil about, and for digging and raking and hoeing it. You know what weeds are. Weeds are plants, and some of them are very useful; but when they grow amongst garden and field crops these plants are in their wrong place. Now look at a paddock full of *Sida retusa*, which the youngest of you can tell from any other weed. This *Sida retusa* is a very valuable plant. Its bark is full of fine, strong, silky threads like flax, and these threads are very useful for making ropes. But you know that no flowers or vegetables will grow properly if they are smothered by *Sida retusa*, so however useful a plant it may be, it becomes a weed because it is in the wrong place, and therefore the farmer and gardener take care to keep it out of their crops. There are other weeds, such as thistles, which grow in great quantities in the winter, and these must be carefully kept down or they would smother the plants we want to grow. There is another reason why weeds should be kept out of a crop. The wheat and oats and barley and potatoes want a great deal of plant food; but the weeds want just as much, and they thus take away the plant food which would feed the crops, and these are consequently not so good as they would be if there were no weeds.

Now let us see what you have learnt in this first lesson. You learned first why the soil in the farm had to be ploughed up, and why it has to be harrowed. Then you discovered what becomes of the rain water which falls on hard ground and on ploughed ground. Furthermore, you learned that the hot sun and the strong wind dry up the land by sucking up the moisture in the same manner as the wind dries a wet pocket handkerchief exposed to it on a clothes line. Then there was something else I showed you. You remember the experiment with the lump of sugar. That showed you that the water deep below the surface is enabled to reach the plants by means of all the little passages through the soft soil. And, lastly, you learned that one reason for constantly stirring the soil is to bring more plant food to the roots of the crop, and the other for the purpose of destroying the weeds, which would, if allowed to grow, either smother the plants you have grown or else use up so much of their food as to prevent them from coming to perfection. One other lesson you must not forget. That is, that even useful plants may become weeds if they interfere with any crops the farmer may be growing.

Many of you have seen fields of wheat, and in some fields you may have noticed quantities of oats mixed with the wheat. Now, oats are a very valuable crop when grown by themselves, but when they get into a wheat field they become weeds, which cause great loss to the farmer, because, instead of his crop being all wheat, it is half oats and half wheat, and is of no use to a miller until the oats are taken out of it.

I will now give you a few questions to answer, and remember this, if you carefully attend to these short lessons, you will have no difficulty in answering the questions without looking at a book, and as you advance further into the subject of agriculture you will be able to answer far more difficult questions as easily as you can answer these eight first ones.

Questions on Lesson 1.

1. What does the word "agriculture" mean?
 2. Why must the soil be ploughed and harrowed?
 3. What becomes of the rain water which falls on hard ground?
 4. What becomes of it when it falls on ploughed land?
 5. How do the plants obtain moisture from the soil in dry weather?—Can you describe an experiment to prove what you say?
 6. What is plant food?
 7. What do you understand by weeds?
 8. Do useful plants ever become weeds?
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AGRICULTURAL EDUCATION IN OUR COUNTRY DISTRICTS.

By FRED. WM. PEEK, Loganholme.

At the Agricultural Conference held at Warwick in June last, I prepared and read a paper on "Farming and Education: A Plea for our Future Farmers," since which time I have received several communications from various persons who are taking a great interest in the education of our farm children, offering suggestions as to what system could be adopted, and how the necessary knowledge was to be acquired by teachers to enable them to teach and train the pupils under their charge. I am therefore pleased to be enabled to give a little additional information, as well as a few practical suggestions that have occurred to me on this matter.

THE FARMER SCHOOL AT HOME.

In introducing this subject, I may be permitted to digress a little by illustrating in a simple manner the present home educational surroundings as we find them chiefly amongst our agriculturists and bush-workers, as well as amongst those engaged in shearing and mining, whose occupation and calling very often takes them long distances from any fixed townships where schools are established, and the education of whose children is, therefore, often a source of great concern to the parents. The latter may have received some education in the past before settling down to country life in Queensland. But the struggling farmer will tell you he has not time to waste in education or reading a paper. He troubles little how the world wags; he is occupied from daylight to dark in the work on the farm, or what he hopes will be one, and in which, very often, he is helped by every member of his family, male and female. The children growing up with no education, or just the little that can be given at odd times, on Sundays or rainy days, when the usual outdoor work cannot be carried on; and in the intervals of mending boots or harness, or sewing, a few minutes perhaps are spared in trying to teach the children to read and write, in a very rough-and-ready manner, and as often as not this is the full extent of the education bestowed on our future farmer in the backblocks. No wonder settlers get dissatisfied with their isolated position and crowd back into towns, where life is made to appear more pleasant, if not so healthy, or so independent. The pleasures of town life and the alluring eight hours per day for labour tend to attract the sons of the soil, who should be brought up to have a stronger liking for agricultural pursuits by better systems of education and by practical teaching.

In those districts where schools are established, and settlement has been steadily going on for the past ten or twenty years, different conditions obtain, and better facilities are given, and it is in these parts of this State that the first steps toward a perfect system of agricultural education could be successfully initiated. Still the farmer goes plodding on according to his own methods and way of thinking, till at last he wakes up to find he is left behind in the race for want of knowledge and

education. And how about the children, the sons and daughters, our future farmers that are to be? How are they brought up? As soon as they are old enough they are taken down to the farm to be early trained (broken-in should be the expression) in the old-fashioned ways, the old jig-jog we all know so well, and this continues till the local school teacher, noticing their absence from school, sends a strong letter, or, more frequently, pays a visit to the home, and, using all manner of arguments, at last persuades the farmer to agree to let his children go to school. But, after all, what sort of attendance is it? Corn and potato planting, corn-pulling, and potato-digging are all taken as so many excuses for the detention of children from school. What little has been learned is soon forgotten, and that little is of small service on the farm. No distinction is made between the teaching in town schools and that of our country schools in the midst of agricultural districts. Nothing is done to meet the difficulties under which sparsely settled districts are placed in as to the initiation of schools, or of new settlements in which the school should be the first thought and care.* I know this State is willing to assist to a certain extent, and is doing so, but it is an education of a different class and of a different order that is now so urgently required in our country schools to fit out and train the future farmer for the battle of life which he must wage constantly to be successful.

PREPARATORY SCHOOLS OR TRAINING SCHOOLS FOR TEACHERS.

"Before we can teach children, we must train teachers." In training teachers in agriculture, provision should be made at the various Experiment Farms and at the College for a short course of practical, as well as theoretical, instruction on subjects pertaining to agriculture, horticulture, and the allied industries. This is at once the easiest and best method of giving the first necessary instruction to teachers in this State, as such farms are now successfully established and in full working order, and the varieties of crops and experiments which are being carried out there are of a more instructive and interesting nature than is possible on the farm of the small settler.

I would suggest that more scholarships be awarded from the State schools to the Experiment Farms, and thence to the Agricultural College. By this system a large amount of sound knowledge would be gained by the teachers, which would fit them to impart the practical teaching it is desired to introduce into our country schools.

LOCAL SOCIETIES AND INSTRUCTORS.

A good deal could be done by our local agricultural societies in assisting the State by suggesting methods of teaching agricultural subjects, as in nearly every district of Queensland there are such societies established, which, as a rule, hold an annual show, and at most of these shows the schools take a prominent part. Still, there has been very little encouragement given in the matter of awarding prizes at such shows for subjects more particularly in keeping with the objects of the shows. I refer to prize competitions for the best kept home or school garden; essays on subjects of agricultural importance, such as climatic influence on plants, the rudiments of draining, irrigation, cultivation, &c., &c., for the boys' competition. For the girls such subjects as home cookery, plain sewing, darning, &c., with essays on home life, dairying, poultry-rearing, chicken-raising, bee-keeping, flower culture, &c., &c., should be presented, all of which are now becoming recognised as distinctly feminine occupations. These subjects would, if added to the usual list of competitions at our local shows, give an increasing interest in the teaching in our schools by the friendly spirit of rivalry created. In nearly every district, and on every school committee, too, there will be found persons able and willing to assist the teachers with a little practical help and sympathy in agricultural matters. Perhaps, however, a better

* A travelling teacher has been appointed for the purpose of reaching the children in the bush.—Ed. Q.A.J.

system would be the grouping of the schools at certain times to receive practical instruction from the experts employed by the Department of Agriculture, or by peripatetic instructors, whose services might be paid jointly by the local societies, or school committees, and the Department each contributing a share towards the cost of such instruction. I am sure the agricultural classes of our country districts would warmly welcome any new departure having for its object the advancement of their children in agricultural knowledge.

REORGANISING AND TEACHING REQUIRED IN ELEMENTARY SCHOOLS.

In undertaking the work of imparting agricultural education in our schools, the Department of Agriculture would only be fulfilling one of its primary functions for which such an institution was created, although up to the present time the elements of teaching and training have been confined first to the higher education, as taught and practically demonstrated at Gatton College, and, secondly, by the instruction that has been imparted from time to time by the occasional visits of officers of the department to the various districts on matters of passing moment and interest to the adult farmer, and which, there is no gainsaying, has been one of the factors in the rapid development of the agricultural industry during the past few years.

Neither must we forget the educational influence of the *Agricultural Journal* on those who have taken the trouble to read, and practice for themselves, the particular articles of interest published from time to time through the medium of its pages. But this has not helped the young ones—the children—whom we wish to see educated in a more practical manner, and to a better standard of agriculture than now obtains. The system now of teaching and the curriculum laid down by the education authorities is undoubtedly good, but, so far as our country districts are concerned, is susceptible of much improvement, as that curriculum is more applicable to town children, whose after life will probably be spent in trade or commercial pursuits. What is desired is an education in our education in our country schools by which our children may be instructed in those matters that will be of particular service to them as farmers and farmers' wives; and I am sure the introduction of Agricultural School Readers, forming a continuous upward course of instruction, would be of great value, attractive, and interesting. Object lessons, continuing through the higher classes, experimental plots attached to the school grounds, where the rudiments and elementary science of agriculture could be demonstrated and practically illustrated, would also prove of the greatest value in the education of the future farmer. For the girls I would advocate simple lessons in domestic economy, cleanliness, cookery, and other matters particularly adapted to home life, the necessary instruction being imparted by visiting instructors at stated intervals, or, as stated, by grouping the various schools in one centre at certain times and places where the elder scholars could receive the necessary teaching and training. I may possibly not have touched upon the best methods of teaching, but I have briefly outlined a system which would meet the views expressed by our farmers for a more practical method of education, and one that would be more suitable for the pupils' calling in after life. It will no doubt be stated by some, especially by those engaged in teaching and those connected with our present education staff, that there is no room for teaching agricultural subjects, the daily routine placed on the school-work list is already crowded, and the teachers' time taxed to the utmost. Granted; but let us pause and consider if there are not some subjects that are now taught in our schools that could easily be dispensed with in country schools, especially during the last year of school life, when the system of practical instruction should take the foremost place in the curriculum. It has been truthfully stated by one of England's greatest statesmen, "that the successful pursuit of agriculture demands the exercise of a broader intelligence than any other calling," a statement that is being brought home with more truth every day. Then let this State take early action in providing a sound

and progressive initiative in agricultural education, and let the first principles of agriculture be one of the chief features in all our country schools. Let a syllabus be drawn up for each course, and it can be left open in the teachers' hands to modify it in the most suitable manner for local requirements, the Departments of Education and Agriculture combining, to aid as far as possible in the initiatory cost of plant or material for successfully demonstrating the lessons it is desired to teach.

P.S.—Since writing the above paper a start has been made by the Department in backblock education of a primary nature by means of a travelling teacher. May success attend his efforts in this new and much appreciated departure.

REPORT OF WORK, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1901.

The Principal, Mr. John Mahon, reports as follows:—

Farm.

The continued dry weather prevented the planting of many crops; indeed many that were planted last month failed to germinate and had to be replanted, thus entailing an extra amount of labour in ploughing, sowing, &c. However, notwithstanding the unfavourable weather, the farm is looking remarkably well. The sorghums and millet planted last month are making rapid growth. The *Paspalum dilatatum* grass has withstood the drought exceedingly well, and now stands 3 feet high, the dry weather having had no effect on it whatever. This magnificent grass is much admired by those who have seen it growing here.

The rainfall during the month amounted to 1.54 inches for six days, the principal falls being on the 2nd, 15th, and 21st, when 0.33, 0.50, and 0.55 fell respectively.

The following is a digest of the work done and the crops planted during the month:—

One hundred and seven acres were ploughed with one 3-furrow, two double, two single, and one 2-furrow sulky ploughs. The different ploughs were used to enable the students to acquire a knowledge of their working and utility. Seventy-five acres of the land above referred to are now ready for planting with lucerne, the greater part of it having been ploughed three times, the second ploughing being to a depth of 12 inches. Eight acres are now ready for planting with grasses and clovers. Ten acres were planted with wheat and Cape barley for green fodder; 4½ acres replanted with Cape barley; 7½ acres with potatoes; 2 acres with Swedes, carrots, and a large number of varieties of pumpkins, which were treated with barn-yard and liquid manures. Maize and millets were also planted for experimental purposes. Fourteen acres of lucerne were cut and converted into hay. Fourteen and a-half tons of chaff, lucerne, and wheaten hay mixed were cut and fed to working horses.

A great deal of cultivating and hoeing crops, burr cutting, wood carting, hauling, and other necessary work has been carried out.

The two draught mares, lately imported from Victoria, have turned out to be splendid workers, and appear to adapt themselves to the climate.

Garden and Orchard.

The top orchard and vineyard were cultivated, hoed, and cleaned up. The grass around the College buildings was mown, and the flower-beds attended to. On the creek:—Small beds were laid out and planted with herbs, radishes, egg-fruit, and chillies, and all vacant land was ploughed up. A number of cabbage (seven varieties) and cauliflower plants were set out. Peas and beans were sown; also turnips and carrots, including seven varieties of the former, and five of the latter.

The orchard and vineyard were cultivated, hoed, and cleaned up. The oranges were manured, one row with bonedust, and one with superphosphate; both rows look splendid and carry a large crop of fruit. This has been the second application of manure, and the improvement is very noticeable.

Dairy.

Fifty-eight head of cows were in milk during the month, the actual yield for the period being 31,774 lb. of milk, approximately 3,096 gallons, giving an average of 547 lb. for each cow, and a daily average of 19·5 lb. of milk per cow. This is an excellent return, especially when we take into consideration that many of the animals have been a long time in milk, and the fact that the pasture has been exceptionally dry at this season of the year.

In the factory, 1,561 gallons of milk gave a yield of 638 lb. of butter, and 688 gallons returned 732 lb. of cheese. Of the rest, 364 gallons were supplied to the dining-hall, 130 supplied for domestic purposes, 322 fed to calves.

The increase during the month was as follows:—Ayrshire, one female; shorthorn, one female. Died during month, one Jersey bull calf. Sold, one pure bred Ayrshire bull and one culled cow. The cattle were grazed on natural pastures throughout the month.

The Ayrshire bull and six heifers (shorthorn), recently imported from Victoria, are in excellent health, the change of climate having had no ill effect.

Pigs.

The increase of pigs was as follows:—Pure Berks, 6 head—3 boars, 3 gilts; small Yorks, 6 head—3 boars, 3 gilts; Tamworth-Berkshire cross, 5 head.

Sold.—Pure Berks, 2 gilts; Mid Yorks, 2 gilts; Small Yorks, 1 gilt; Large Yorks, 2 gilts; Tamworths, 1 gilt. We also sold as baconers 14 head, and killed 3 head for the use of dining-hall.

Mid York, 1 gilt died (a weakling).

The Tamworth-Berkshire Cross.—The result of this cross is not very encouraging, the pigs being weak, delicate animals, which will take a long time to grow to maturity. Reliable information as regards this or any other cross carried out here will be made known when the pigs are ready for market. I have experimented with the Middle York boar crossed with the Berkshire sow. The results from this are most satisfactory. I find the young pigs (now about three months old) fine, strong, healthy animals, good doers, well developed, and with better hams than are to be found on the best of Berkshires. These young pigs are, without exception, white, and resemble the pure Yorkshire in every respect.

EXTRACTS FROM THE MONTHLY PROGRESS REPORT FOR FEBRUARY OF THE BIGGENDEN STATE FARM.

Again I have to report the continuation of the severest drought ever experienced here. Whilst during the month good rains have fallen along the coast, also in the Isis and Nanango districts, this part has had very little, only 2·55 inches having fallen in eight days, distributed throughout the month. For many days we were on the western fringe of the rain belt. The sky was cloudy, with now and then small drizzling showers barely amounting to 0·01 in twenty-four hours. Had the land been previously well soaked, such a weather would have been favourable to the growth of plants. But as it was extremely dry to a great depth, those little showers practically evaporated as soon as they reached the ground. They have been sufficient, however, to cause a small spring in the grass and in the growth of weeds usual at the time of the year.

If the season has been extremely disappointing from a grazing and farming point of view, it has at least served to illustrate, in an unmistakable manner, the value of thorough tillage of the soil, and to make obvious the drought-resisting qualities—or otherwise—of various crops.

Of maize, for instance, only the spring crop harvested in January has succeeded to any extent, and that only with the variety called Golden Ring.

Subsequent sowings made in November and December, respectively, had to be ploughed out.

A fourth sowing made in the first week of January is now only 6 to 8 inches above ground. It is hardly likely that it will be able to mature its cobs before they are overtaken by the early frosts, unless, of course, the winter should prove very mild.

The same may be said of the Cucurbitaceæ sown between the rows of corn. Most of the pumpkins, marrows, squashes, &c., dried up, although many successive sowings were made,

The same happened with most of the varieties of rock and water melons, although we had some very fine specimens of the Kobb's Gem, Cuban Queen, and Ice Cream, also of the Improved Delmonico, Large Persian, Mount Real Market, and of a new variety of great promise and queer shape, called the Assage.

A small variety—the mango melon—deserves special mention, it being very hardy indeed. It is about the size and shape of an orange, and of a beautiful golden colour. Its smell is very pleasant. To the palate it is perfectly nasty and repulsive when eaten raw. But when first peeled and then well stewed in syrup it makes an excellent dessert dish, reminding one of both stewed apples and peaches.

We have saved seeds of the best specimens of all the above varieties.

Of pineapples we have two varieties—the Ripley Queen, which gave practically no fruit at all, and the smooth-leaved variety, which gave only small stunted fruits. This is attributable no doubt to the excessively dry spring and summer, and also to the fact that on the 1st of July last by 17 degrees of frost on the grass most of the lateral leaves had been frozen, which deprived the plants of the means given them by Nature to collect moisture and bring it towards the roots. I gathered what fruit there was before it was ripe, with a view to alleviate the strain on the plants, and, if possible, ensure a crop for next season.

Of tomatoes we have a few plants of twenty odd varieties, all doing well, although they have never been watered.

They are grown on stakes in deeply-worked soil, and kept regularly pruned. Had they been allowed to overburden themselves with bushy growth most of the plants would be already dead, and the others would have no fruit worth speaking of.

All the sorghums and millets were more or less stunted. Still they would have proved a great stand-by to any farmer, especially to one engaged in dairying.

Amongst them the broom millet stood the dry weather best. It gave some very nice fibre and fine seeds for next season.

Of the pulses, the cow pea, the Mauritius, and the velvet beans kept green and growing throughout the summer, although there will be very few pods and seeds on them.

Of the various grasses we have under observation, the *Paspalum dilatatum* has stood best the severe strains of the season. I notice with pleasure that the grass is rapidly coming into favour with all those who have seen it. During the month we had numerous inquiries for rooted plants from nearly every part of Queensland. We have still a few roots left for distribution.

The Mitchell grass (*Astrebla pectinata*), which is indigenous to Western Queensland, comes probably next as a drought-resisting grass. True, it withered for a time, but it quickly revived after a few showers. It is likely to do well on any good well-drained forest land, and would always be a valuable adjunct to any pasture. The lucerne sown broadcast has been dormant and dry up to now, whilst what was sown in drills and kept tilled has kept growing throughout the summer. We have got from it a second cutting from 12 to 18 inches high, and now it is again a good deal ahead of the one sown broadcast. The Turkestan lucerne does not grow quite so high as the ordinary variety, but it seems to stand dry weather better. I would advise our friends in the drier districts

to give it a trial on a small scale, as I believe it would grow where ordinary lucerne could not.

Of our twenty odd varieties of sugar-canes, some such as the Jong-Jong, the Rappoe, Bratoe, Mauritius, Gingham, &c., are from 3 to 4 feet high, whilst others are quite stunted, all evidently suffering from a want of moisture.

Amongst the vegetables, the New Zealand spinach and the Swiss chard (or silver beet) are undoubtedly the best drought resistant.

Although of a negative nature, the experiments carried on on our manure plots are extremely interesting and instructive.

The land was divided into four quadrangular plots of exactly the same size and half-a-chain broad.

Plot 1.—No manure whatever.

Plot 2.—Superphosphate and kainit at the rate of 5 cwt., and at a cost of 23s. per acre.

Plot 3.—Dried blood and bonemeal, 4 cwt.—21s. per acre.

Plot 4.—Superphosphate, kainit, dried blood, and bonemeal, 4 cwt.—20s. per acre.

Right across the four plots we sowed eighty different varieties of crops, so that one could see at a glance the beneficial effects of various combinations of fertilisers on the different crops.

Result.—It would have taken a very smart man, indeed, to tell any difference in the growth of the same crop on the different plots.

From this we conclude that a farmer who would have in a season like this applied commercial fertilisers on his fields, would have wasted his time, money, and labour. Most commercial fertilisers act only chemically on the soil, and are of no use whatever if there is not at the same time enough moisture to dissolve them and make them available as plant food. This is, of course, well known to professional chemists and experimentalists. It is also the conclusion arrived at by such skilful agriculturists as the Brothers Gibson, of Bingera Plantation, near Bundaberg. For years past they have spent thousands of pounds on fertilisers for their canefields, but they have invariably found that their results were *nil*, unless they had the season as well. I am informed by one of them that they are now going in for a large irrigation scheme which will necessitate the outlay of from £30,000 to £40,000. Of course, with the command of the required moisture, they are pretty sure to derive the full benefit of any fertiliser they may use.

With stable manure also these drawbacks are sometimes felt, but never to the same extent, as the stuff is bulky and acts on the soil mechanically as well as chemically.

I even venture to assert that had my circumstances allowed me to have a fifth plot with nothing on it but a good layer of pure sand from 3 to 4 inches thick, and well mixed with the arable soil, I would have had better results on it than on any of the others, as a permeable soil stands dry weather so much better than a clayey, caking one.

The above described plots have been again ploughed and pulverised independently of one another and without mixing their respective soils. They are now being resown with various autumn and winter crops; our object being to try and see whether they will feel to any extent the benefit of the spring manuring.

In addition to harvesting and storing more of the above-referred crops, which are all grown here only experimentally on a small scale, we have, during the month, planted about twenty different varieties of potatoes, sown all sorts of cabbages, cauliflowers, beetroots, &c. These are now ready for transplanting as soon as weather will permit.

We have ploughed all available land and got it ready to receive autumn and winter cereals as soon as we get the seed and the weather will be favourable; and have also scarified, harrowed, and chipped both the orchard and the vineyard, which, like the rest of the farm, looks tidy and in good order.

Dairying.

HAM AND BACON CURING.

The following method of curing bacon is given in the *Agricultural Gazette*, London:—

The sides are laid on benches and pumped in about seventeen places with a pickle testing 100 degrees on the (Douglas) salinometer at 60 degrees Fahr. The pumping pressure should be 40 lb. per square inch as indicated on an ordinary pressure gauge. The sticks of the pump needle are all into the flesh parts, the thin flank not being pumped at all. The pickle used consists of 55 lb. salt, 5 lb. saltpetre, 5 lb. antiseptic, and (in winter only) 5 lb. pure cane sugar. These ingredients are made up to 20 gallons with fresh water and stirred until the whole are dissolved. The pickle is then allowed to settle until clear, and is better if it is boiled and skimmed. In any case the clear pickle is run into the cellar, and is not used until it is of exactly the same temperature as the cellar. Immediately after the sides are pumped they are laid down rind downwards, and covered lightly with an equal mixture of dry antiseptic and fine saltpetre. On top of this is laid a heavy layer of salt. The sides are "stacked" one on top of the other, and the thin flank, or belly portion, is kept up by the means of oak staves. The pickle, therefore, which naturally forms, collects in a sort of saucer formed by the ribs.

The stacks are not meddled with until their cure is complete, which is in ten days for 9-score and twelve days for 10-score pigs. After that time in salt the bacon is "struck," and, according to the market to be supplied, is drained, washed, trimmed, and sent off. Much of the bacon consumed in England is smoked, and many factories have facilities for smoking. The smoke stores want a good deal of watching and care, and should always be under a competent man. Cured bacon is drained from seven to ten days, and is then washed, wiped, and trimmed. It is then dusted over with peameal, and hung in the smoke store for three days at a temperature of 85 degrees Fahr. The smoking material used is oak sawdust. After the bacon is smoked it is packed up in bales with clean barley or wheaten straw between each side, and is sent out. When the bacon reaches the provision shops it is cut up into recognised sections; there, so far as we are concerned, its history ends.

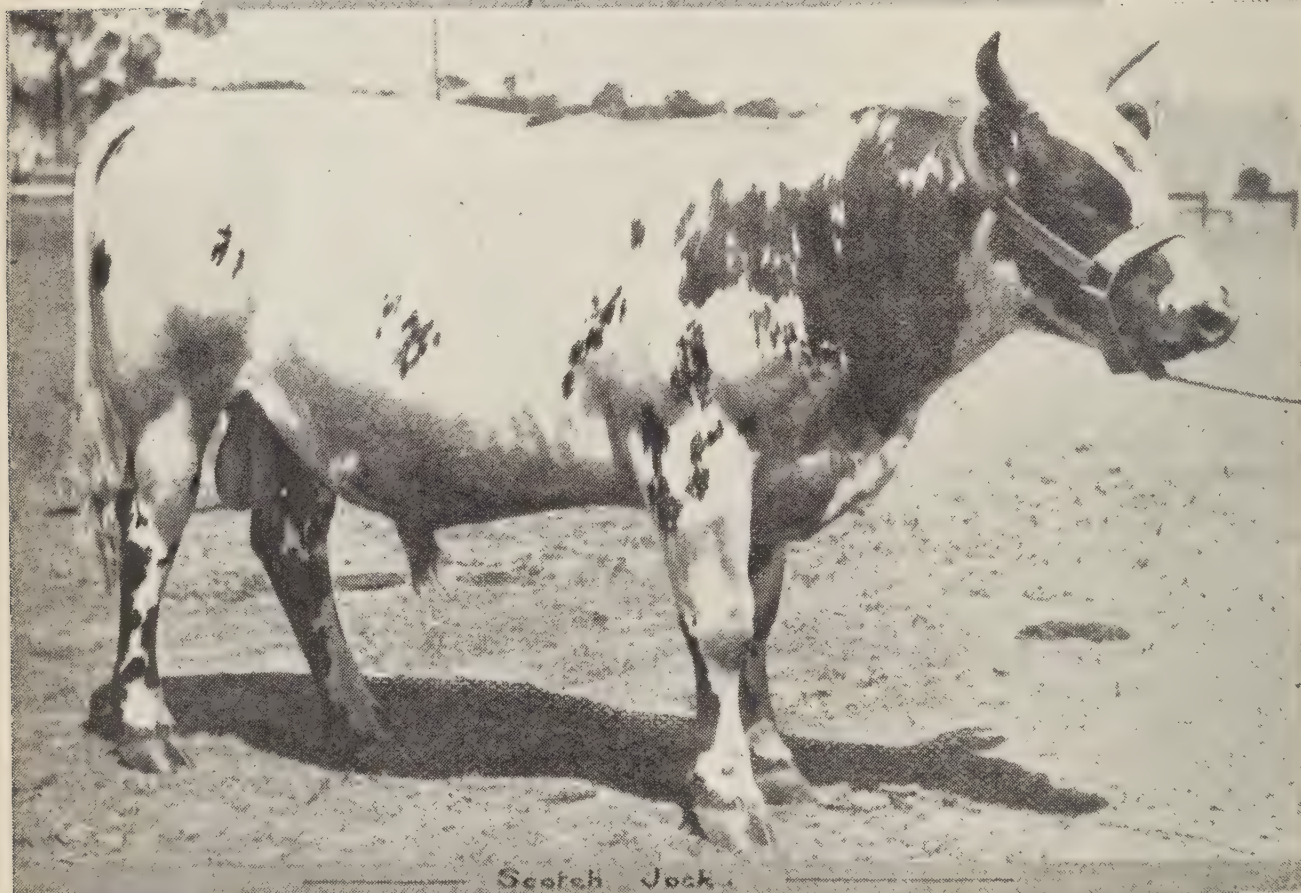
Hams require very careful treatment. The cure is on precisely the same principle as bacon-curing, and the same curing materials are used. But if taint is to be avoided "purging" has to be done so as to get rid of the blood in the blood vein. The general rule, so far as time for curing is concerned, is to allow one day to every pound weight, adding on three clear days for "purging." In most bacon factories where hams are cured they are dried also; another operation is conducted very slowly at a temperature of 80 degrees Fahr. If pale dried hams are wanted quickly they are dried in the smoke stores at a temperature of 95 degrees Fahr. for three days.

PIG PRODUCTS.

The cocoa-nut palm is one of the trees most remarkable for the number of its products and for the uses its various parts can be put to. In the same way the animal world is represented by the pig. It is wonderful what a number of products come from that most useful animal. A few of these are bacon, hams, lard, lard oil, stearine (used for margarine), albumen from the blood, tooth brushes from the bristles, glue and gelatine from the bones, yellow prussiate of potash from the toe-nails, hair for bedding, chair-stuffing, &c., sausages, pork pies, brawn, pepsin, leather used for saddles, tyres, purses, book-binding, &c. The multitude of products is bewildering, and one can only contemplate with wonder that the pig is so persistently neglected as a factor in the economy of the farm.



Ayrshire Heifers.



Scottish Friesian.



Shorthorn Heifers.

QUEENSLAND AGRICULTURAL COLLEGE.

VALUABLE ADDITIONS TO THE COLLEGE DAIRY HERD.

Mr. John Mahon, Principal of the Queensland Agricultural College, recently visited the Southern States with the object of purchasing some pure dairy stock for the College herd.

Those selected have arrived at the College, and we have received photographs of them, which are reproduced in this issue.

Scotch Jock is a pure Ayrshire bull, calved 5th October, 1899. His sire was Scot of Seafield (206); dam, Fanny (673), by Glen Elgin's Bruce (129); g d, Fairy 1st, by Blenheim (10). Fanny has taken eleven 1st and nine champion prizes; also Lord Brassey's medal at Bacchus Marsh, 1899. The full pedigree of this bull was given in the March issue of this *Journal*.

One pure Ayrshire bull, calved 11th December, 1899; sire, Scot of Seafield; dam, Clara of the Pines (636), by Lord Gordon (191); g d, Clara of Seafield (637), by Scotland (84).

One pure Ayrshire heifer, calved 12th November, 1899; sire, Scot of Seafield; dam, Fairy 1st, by Blenheim (10); g d, Fairy, by Lord Borwick.

One pure Ayrshire heifer, calved 11th August, 1899; sire, Scot of Seafield; dam, Mollie Gordon (742); g d, Mollie, by Glen Elgin's Bruce (129).

One pure Ayrshire bull, Bob, calved 17th September, 1899; sire, Melton, by Blenheim; dam, Lady May, by Gordon; g d, Lucy (212), by Lord Seafield (60). Bob was 1st-prize yearling bull at the Bacchus Marsh and Ballan shows, 1900.

Four choice Shorthorn dairy heifers as follow:—

One dark-roan heifer, calved February, 1899; sire, Spots Raglan, by 32nd Duke of Athol; dam, Mr. Lidgett's show cow, by Red Knight, a winner of eleven 1st and 2nd prizes in dairy sections.

One dark-red heifer, calved 9th October, 1899; sire, 32nd Duke of Athol.

One roan heifer, calved February, 1899; sire, Spots Raglan.

One red and white heifer, calved February, 1899; sire, 5th Duke of Portland; dam, by Red Knight.

One roan Shorthorn heifer, calved April, 1899; sire, 5th Duke of Portland; dam, by 17th Duke of Athol.

One light-red heifer, calved April, 1899; sire, Marmion, by 17th Duke of Athol; dam, by Red Knight.

The above cattle are from the well-known herds of Mr. J. T. Burnip, Coimadai; Mr. T. Myers, Cairnbank, Myrniong; and Mr. R. Lidgett, Highton, Myrniong.

PEDIGREE OF PURE-BRED AYRSHIRE BULL, SCOTCH JOCK.

Description: White and brown, calved 5th October, 1899; bred by J. T. Burnip, "The Pines," Coimadai, Victoria.

Sire—Scot of Seafield (206).

Dam—Fanny (673), by Glen Elgin's Bruce (129).

g d Fairy I., by Blenheim (10).

g g d Fairy, by Lord Berrich.

g g g d Mamie, by Master Cock.

Fanny, the dam of Scotch Jock, has taken ten 1st and nine champion prizes, also Lord Brassey's prize for the best dairy cow at Bacchus A. and P. S. show in October, 1899.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 28TH FEBRUARY, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Com- mercial Butter.	Remarks.
			Lb.			
Lavina ...	Ayrshire ...	6 April, 1900	190	3.9	8.29	Dry, 27-2-01
Rosebud ...	" ...	10 April "	714	3.8	30.38	
Ream ...	" ...	24 July "	550	3.6	22.17	
Isabelle ...	" ...	7 July "	502	3.7	20.80	
Lena ...	" ...	13 July "	551	3.7	22.83	
Leesome ...	" ...	1 Sept. "	785	3.8	33.4	
Ream Routhie ...	" ...	20 Sept. "	542	3.7	22.46	
Ruth ...	" ...	8 Oct. "	384	3.7	15.91	
Annie ...	" ...	8 Oct. "	320	3.5	19.26	
Laura ...	" ...	28 Aug. "	467	3.5	18.3	
Renown ...	" ...	29 Nov. "	541	3.6	21.81	With first calf
Laverock ...	" ...	19 Dec. "	935	3.6	37.69	
Jersey Belle ...	Jersey ...	21 May "	337	5.3	20.0	
Content ...	" ...	18 July "	508	5.0	28.44	
Playful ...	" ...	14 July "	638	4.2	30.01	
Baroness ...	" ...	3 Aug. "	443	4.5	22.32	
Carrie ...	" ...	18 Aug. "	525	4.2	24.69	
Spec ...	" ...	26 Aug. "	421	4.4	20.74	
Stumpy ...	" ...	29 Aug. "	725	4.4	35.72	
Evileen ...	" ...	2 Sept. "	560	4.8	30.1	
Beatrice ...	" ...	3 Sept. "	390	4.4	19.11	With first calf
Connie ...	" ...	8 Sept. "	501	4.2	23.56	
Ivy ...	" ...	28 Aug. "	424	4.1	19.47	
Bashful ...	" ...	2 Nov. "	450	4.4	22.17	
Russet ...	Grade Shorthorn	7 Oct. "	562	3.6	22.65	
Alice ...	" "	13 Nov. "	670	3.7	27.76	
Eva ...	" "	18 May "	312	3.8	13.27	
Stranger ...	" "	7 July "	584	3.9	25.5	
Duchess ...	" "	24 Aug. "	544	3.6	21.93	
Restless ...	" "	3 Sept. "	650	3.8	27.66	
Rosella ...	" "	5 Sept. "	711	3.7	30.46	[Dry, 20-2-01
Lucy ...	" "	27 Sept. "	680	3.7	28.17	
Leopard ...	" "	29 Sept. "	564	3.5	22.10	
Redmond ...	" "	12 Sept. "	674	3.8	28.68	
Laurel ...	" "	10 Sept. "	606	3.7	25.11	
Empress ...	" "	20 Nov. "	680	3.7	28.17	
Curly ...	" "	10 Dec., 1899	710	3.6	28.62	
Trial ...	" "	31 Oct., 1900	895	3.7	37.08	
Rusty ...	" "	23 Dec. "	804	3.6	32.41	
Ginger ...	" "	19 Dec. "	840	3.8	35.75	
Polly ...	" "	21 Feb. "	185	3.8	7.87	With first calf
Violet ...	Shorthorn	9 Oct. "	652	3.8	27.74	
Gladdy ...	" ...	2 May "	304	3.8	12.93	
Louisa ...	" ...	6 April "	555	3.6	22.37	
May ...	" ...	20 May "	102	3.8	4.34	
Nestor ...	" ...	21 April "	422	3.8	17.96	
Spot ...	" ...	11 Sept. "	506	3.7	20.96	
Kit ...	" ...	28 Sept. "	606	3.7	25.11	
Plover ...	" ...	3 July "	701	3.8	29.83	
Queenie ...	" ...	29 April "	270	3.9	11.79	
Frizzy ...	" ...	23 Aug. "	520	3.7	21.54	With first calf
Maggie ...	" ...	20 June "	303	3.8	12.89	
Pet ...	Grade Jersey	14 Aug. "	402	3.4	15.3	
Pansy ...	" "	4 Dec. "	690	3.9	30.13	
Fancy ...	South Coast	21 May "	451	3.9	19.69	
Damsel ...	Holstein ...	19 Jan., 1901	1,125	3.1	39.06	
Effie ...	Jersey ...	6 Jan. "	855	4.4	42.13	
Blink ...	Ayrshire ...	21 Feb. "	206	3.7	8.53	

The dairy herd grazed on natural pasture, which, owing to its dry nature, was not conducive to high yields

HOME SEPARATORS.

The *Iowa Homestead* prints the following points for and against home separators :—

FOR.

1. Supplier saves expense of hauling milk to and from the creamery, the creamery usually gathering the cream where farm separators are used.
2. Cream can be gathered from a larger territory with the same hauling facilities.
3. Less number of cans needed to transport material.
4. Skim milk retained at farm in best possible condition for feeding.
5. Every farmer gets his own skim milk; therefore no difficulty in its division (as now at the creamery), and less danger of spreading bovine diseases.
6. Smaller bulk of material to be cooled and cared for.
7. Less sour milk and cream. (It is argued by some that cream will not sour as fast as milk owing to the reduced proportion of acid-forming material.)
8. Quality of cream better when separated immediately after milking.
9. More thorough separation when run immediately after milking.
10. Cream need not be delivered to factory daily even in hottest weather.
11. Less chance for farmer to be cheated on tests.
12. Saving of cost and expense of operating separator at factory.
13. Less work for butter-maker.

AGAINST.

1. Greater cost of the machines to skim the same amount of milk.
2. Too many machines to be operated by as many individuals, resulting in imperfect work, excessive repair expenses, and greater cost of operating materials, oil, &c.
3. Separators liable to improper care, cleaning, and operation, causing poor cream and loss of fat.
4. Even under favourable conditions, large separators do better work.
5. Loss of cream from adhering to sides of vessels.
6. Lessen conditions favourable to pasteurisation.
7. Cream would not be of as good quality.
8. Probability of less frequent gathering of cream.
9. Cream more liable to contamination, being handled more.
10. Cream more liable to taint than milk.
11. Farmers separate the warm cream into the cold, producing poor flavour.
12. Cream undergoes more and greater changes of temperature and generally reaches creamery more or less fermented.
13. Too great irregularity in fat percentage and acidity of cream.
14. Bacterial action not so fully under butter-maker's control.
15. Butter-maker does not have full control of the milk.
16. Greater difficulty in securing a representative sample of testing and in testing the same.
17. Butter-maker does not come in personal contact with milk producer, and is less able to influence him in the care of his milk and cream.
18. If part of the suppliers bring whole milk and part separator cream, it will mean more work for the butter-maker, and more expense in running factory.
19. More serious matter and more difficult to reject poor cream than poor milk.

WORKING OUT BUTTER RATIO.

In a dairy where it is known what quantity of milk comes in and the quantity of butter that is made, working out the butter ratio is a good check on the management. The practical farmer judges the quality of the milk by the weight of butter yielded; he often fails to think, however, when there is a

low yield, that it is the fault of the management in not skimming closely enough, churning the cream too sweet, and leaving too much fat in the buttermilk, and the food of the cows is generally blamed for producing poor milk.

With a butyrometer to test the quality of the milk to begin with, it is an easy matter to calculate the amount of butter that should be produced. If the amount expected is not actually made, the loss must be looked for first in the separated milk, and then in the buttermilk. If the loss is found to have taken place in the buttermilk, then the cause may be put down to cream not properly ripened, or churned at too high a temperature. If remedying these points still leaves an excess of fat in the buttermilk, the cause may be put down to the churnability of the butter-fat, which varies at times, and with the foods fed the cows, and may to a certain extent be remedied.

Supposing the yield of milk on a farm in three days is 100 gallons, which, on being separated, gave 10 gallons of cream (taken off at the rate of 10 per cent.). The average quality of the milk was 4 per cent. fat.

A deduction from this of .2 per cent., which is the amount lost in separating.

The butter-fat contained in the 10 gallons or 100 lb. of cream then is 38 lb.

Now 3 per cent. of the total butter-fat in the cream is lost in the buttermilk on churning. The finished butter does not consist solely of fat, but contains in all about 15 per cent. of other substances, principally water, with small quantity of casein, salt, &c. Thus :

$$38 \times \frac{97}{100} \times \frac{100}{85} = 43.36 \text{ lb. of butter yielded, roughly } 43\frac{1}{4} \text{ lb.}$$

Now, dividing this quantity into the number of pounds of milk, $\frac{1000}{43\frac{1}{4}} = 23.1$,

which shows that 23 lb., or a trifle over $2\frac{1}{4}$ gallons, of milk yielded 1 lb. of butter. This is the amount that should be yielded from milk of such richness (after allowing for losses) if proper management of the dairy is being carried on.—*Agricultural Gazette*.

FINDING THE CAUSE OF FISHY BUTTER.

The New South Wales dairy expert, Mr. M. A. O'Callaghan, claims to have recently discovered the organism causing that very unpleasant flavour known as "fishiness" in butter. He has been investigating the subject for many months, and declares that the organism is a mould, known as *Oidium lactis*. Several dairy bacteriologists supposed that *Oidium lactis* was simply a stage in development of several moulds, and not a distinct species. The reason for this, perhaps, is the fact that in its life history it attacks the butter, lives its life, and consequently sets up a stronger flavour of "fishiness" at one time than at another. *Oidium lactis* forms white colonies on gelatine media, which it does not liquefy; pasteurisation of milk or cream will kill the organism; and dirty conditions are congenial to its preservation. Previous investigators thought that the presence of the lactic acid bacillus in milk or cream would prevent the growth of *Oidium lactis*, but Mr. O'Callaghan finds that this is not so. The lactic acid ferment introduced into cream as a starter will not kill the spores of the fishy mould; both will exist side by side, and when a butter with *Oidium lactis* is kept for several weeks will develop that fish-like oil flavour that is so objectionable in either cheese or butter. Cleanliness keeps the mould at bay, and pasteurisation, properly carried out, kills it if it is introduced. The export butter industry depends entirely upon a high quality keeping butter being at all times manufactured and shipped; hence the advantage of a thorough understanding of the causes that go to make an inferior article.—*Dalgety's Review*.

Poultry.

SELECTION OF FOWLS FOR EGG-PRODUCTION.

For egg-production the breeds which give the best results are those included in the non-sitting and general-purpose class, says Mr. Brown, in an article on the "British Egg Supply," which appears in the new *Journal* of the Royal Agricultural Society. The finest races of table poultry do not excel as layers. In these latter races the average number of eggs produced will be comparatively low, and in many breeds will not be sufficient to pay the cost of maintenance. Their eggs are much more valuable as potential chickens. Whether a non-sitting or general-purpose breed should be chosen must be determined by the farmer himself. As a rule, the non-sitters give a better yield in eggs, but, from the fact of the maternal instinct being suspended, it is requisite to make other provision for hatching and rearing the young stock; and, probably, owing to their being non-sitters, they are not so prolific in winter as are the general-purpose breeds.

A further point in connection with these non-sitters is that they are slighter in body, smaller in size, and less fleshy than the general-purpose races, and hence the surplus birds do not afford the same returns when sold. In this connection it is important to observe what is done in Belgium, where it is found that for milk chickens and poulets de grains, or spring chickens, the best results are obtained by the use of non-sitters, as they grow so much more rapidly, are lighter in bone, and carry a greater amount of meat at the same age than either table or general-purpose varieties. Such a fact will be of importance to those who keep the lighter breeds for egg-production, as they can realise better prices for surplus cockerels if these are killed at an early age. In districts where there is a good demand for medium qualities of table poultry, and where yellow-fleshed birds are not regarded as inferior, the general-purpose breeds are preferred. The loss of a few eggs is more than compensated by a higher price for chickens. And if the breeder prefers to use natural rather than artificial methods of hatching and rearing, the latter should be chosen. It is entirely a question of balancing the respective qualities. The breeds which rank under the two classes named are as follow:—Non-sitting varieties are Hamburgs, Campines, Minorcas, Leghorns, Anconas, Andalusians, Redcaps, Houdans, Scotch Greys, Barbezieux. General-purpose varieties are Plymouth Rocks, Wyandottes, Langshans, Orpingtons, and Brahmas. There is, as may be inferred, some difference among the breeds included here. Some are to be preferred under certain conditions more than others, but all are of practical value.

HOW TO TELL FERTILE EGGS.

A skilled eye can tell the difference between fertile and unfertile eggs in three or four days after setting, but it will be better for you to wait until the eighth night. Go to the sitting-house when it is quite dark and take with you a candle or lantern, preferably of the bull's-eye type, and a fresh-laid egg. Take the latter between the forefinger and thumb, so that it is surrounded by a dark frame, and hold it up to the light. It will be clear and transparent, nothing dark showing behind the shell. Now take the eggs, whether fowls or ducks, one by one from under the hen, and examine them in a similar way; the unfertile will look like the fresh egg, the fertile will show dark patches behind the shell. The difference should be at once apparent; but if you are doubtful about any, it is safer to mark them and replace, and test again a day or two later. The unfertile should be removed and hard boiled for the future chicks.

FEEDING FOR EGG-PRODUCTION.

It would appear that most owners of poultry pay very little attention to the necessity of discriminating between food that fattens and food which is conducive to egg-production. In England, where maize is not so plentiful as it is in Queensland, keepers of poultry, as distinguished from breeders and egg-producers, are yet warned against the evil of over-feeding with maize. A writer in the *Farmer and Stockbreeder* on this subject gives some good advice on feeding for egg-production. He says:—

The question of feeding is one of great importance. Soft food, made of barley-meal and sharps, mixed with water to a crumbly mass, should be given for the morning's meal. Hard corn, such as wheat, or barley and wheat mixed, makes an excellent afternoon's meal. If there is one article of food more misused than any other in feeding poultry, it is maize or Indian corn. Its over-use produces a deposit of fat in all available parts of the body, which in time is likely to be followed by an affected liver.

In feeding for egg-production, a valuable lesson may be learned from Nature. Many of our domestic fowls, which receive little care and attention, or, in other words, whose conditions approach more nearly the natural conditions, lay most of their eggs in spring. It is our duty then, as feeders, to observe the conditions surrounding these fowls at that time. The weather is warm; they have an abundance of green food, more or less grain, many insects, and plenty of fresh air and exercise. Therefore, if we are to feed for egg-production, we should try to make it springtime all the year round, not only in providing a warm place for the fowls, but also giving them good food, a proper proportion of green food, grain, meat, pure air, exercise, and clean pure water. Green food—if no grass in runs—should be supplied daily, plenty of grit and lime in some form, and last, but not least, clean fresh water daily.

All pullets should be allowed to become fully matured before being asked to bear the strain of egg-production; they cannot do two things at the same time—grow, and make eggs. A pullet should be six months old or over before she is started laying, if you want her to make a good hen.

POULTRY.

By JAMES TROW, Rocklea.

It is very well known that farmers' wives and daughters, with their loose methods and in some cases inbred stock, have much larger broods of chickens than the fancier with all his up-to-date notions, while coming to rearing of chickens, the farmer's household can knock spots off the fancier; they rear them on the simplest of diets, and rear large broods with the smallest percentage of loss; the fancier, with chopped egg-shell, grit, and fifty other fads, raises, perhaps, about one-half.

Fowls can adapt themselves pretty well to any circumstances, and if well fed they thrive as well roosting on a fence as they would in a close ornamented house, but I wish it to be distinctly understood that I do not advise the open-air principle, my object being to show that ten to twenty broods of chicks would be very acceptable to the farmer, and that to rear them does not mean any additional outlay to him, as any shed with a decent roof to keep off the rain would meet all requirements, as the climate here is so different to the old country climate.

March is a good month to set a few hens, so as to get pullets to lay about Christmas. Of course, the chances are that the most of them will lay about September or October, especially where the Leghorn, Hamburg, Minorca, and Spanish crosses have been used, but I find that those hatched just before the winter require a little longer time before starting to lay, but by proper treatment will be sure to lay at Christmas, and so ensure a few eggs about that time.

I always find it a good thing to put the hen and chickens in a coop at night, letting them out the first thing in the morning, taking little heed of dew or weather, because during the day when the little chicks require some feed it is easily put under the coop, where they can feed unmolested by the older birds.

POULTRY NOTES.

The incubator may be necessary to the fancier for early hatched chickens, or to the large breeder for a continuous supply, but to the farmer it is quite another thing, for the simple reason that fowls kept on a farm are under more natural conditions than those of the fancier or suburban breeder; and if proper stock is kept on the farm, and a regular supply of eggs arranged, the result will be plenty of broody hens.

Now, as regards diseases of poultry, all the works on poultry treat of them; but I am inclined to touch on this very lightly, as poultry diseases are many, and there are just as many "certain cures." Still, thousands of birds of all ages die annually; but of all classes of people who raise chickens, there are none who can show such a clean bill of health as the farmer's wife, disease rarely reaching farm poultry except by the introduction of fresh blood from some infected yard.

Why should farmers have to run the risks of losing chicks by the purchase of diseased stock? I think that breeders should be content to breed only one variety of fowls in a backyard, and keep them free from disease. Then he who could show the cleanest sheet would be amply repaid. However, prevention is better than cure, and all fresh stock brought on to a farm should undergo a term of quarantine—say for fourteen days—and meanwhile be disinfected. This would be the means of saving a large number of valuable stock. It has often struck me, when I have met farmers who have lost nearly the whole of their stock through purchasing diseased birds at our annual shows, what a mistake it is that a more rigid examination of stock at shows is not made, and all birds showing signs of any ailment sent back. I have seen birds in the show pen that should have been taken away at once, and I have afterwards heard that these birds had died a few days afterwards; yet some of them took a prize.

Now, a farmer can get all the changes he may require, in the shape of male birds, from amongst his neighbours, and thus prevent a great deal of disease, buying about every second year some well-selected cock from a good healthy strain.

BRAIN DISEASES IN POULTRY.

Says an American bulletin:—Poultry are quite susceptible to diseases of the brain. Commonly, symptoms of brain disorder are due to indigestion or intestinal worms. The removal of these causes may lead to recovery; otherwise no remedy can be applied.

Vertigo, due to congestion of the brain with blood, shows itself in an unsteady, staggering gait, the bird walking backward, sideways, or turning in a circle. Sometimes this giddiness is followed by epileptiform attacks. As treatment, apply ice to the head until thoroughly cooled. Then open the bowels with a purgative, as Epsom salts 30 grains, or calomel $1\frac{1}{2}$ grains. Keep the bird in a quiet, shady place. If this method is not successful, administer bromide of potassium in 1 to 5 grain doses three times a day. If the trouble is due to intestinal worms, treat the fowl for worms.

Epilepsy, commonly known as fits, is occasionally seen in fowls. Birds attacked may fall and may lie on either the back or the abdomen, the eyes opening and closing. After a time the attack subsides. Unless due to intestinal worms, no reliable treatment is known.

The Orchard.

FRUIT REFUSED PASSAGE.

The care exercised in Vancouver by the fruit inspectors to ensure the shipping of none but the best fruit to the Australian States is shown by the action of a fruit inspector at that port. He examined a consignment of 700 boxes of fruit from San Francisco *en route* to Australia shortly before the steamship "Miowera" sailed for Sydney, the fruit being booked for the ship. He condemned and burned fifty-three boxes, and informed the shipping clerk of the "Miowera" he did not believe the rest of the fruit would pass muster when it reached Australia, as the Australian authorities are very strict. The "Miowera" thereupon declined to accept the fruit, and the consignment has since remained upon the Canadian Pacific wharf. It has been decided to ship the fruit back to San Francisco.

MANGOES.

By D. O'CONNOR, Oxley.

A leaflet issued by the Department of Agriculture, 28th February, 1891, on "Profitable Uses of the Mango Crop," commences—"The mango (*Mangifera indica*), so far as it has been tried, apparently finds conditions suited to its perfect development in all parts of the coast country of Queensland. It grows with great rapidity and vigour, is a free bearer—although in certain localities it shows a tendency to fruit in alternate years—the fruit of the mango is most delicious, health-giving, and nutritious." The remainder of the paper may with advantage be transferred to the pages of this *Journal*.

Probably no fruit in Queensland has of late years received as much attention as the mango, and deservedly so, for most persons who have eaten a really good mango regard it as the king of fruits. Comparatively few persons, however, have tasted high-class mangoes; they are still very rare. While a first-class mango might worthily occupy the top of the list of fruits, inferior kinds should be placed near the bottom. Even for cooking purposes a good mango is far preferable to an inferior one. This reason alone should be a sufficient inducement to growers to cultivate only good varieties. Much may be done to improve our mangoes; firstly, by eradicating bad varieties. This may be accomplished by budding or grafting, as hereafter described. Secondly, by cultivating with care the better forms, and thirdly, by importing the choicest varieties procurable. The highest class mangoes are not common even in India; some care and expense may be necessary to secure some of the finest. The choicest in India are said to be owned by wealthy natives, who guard them with great care. These would probably be unpurchasable, some other means would, therefore, be necessary to obtain them, possibly by exchange. In India, the home of the mango, it is propagated mainly by one of the following methods:—Firstly, by sowing the seed. This is the easiest way, and affords some prospect of getting improved varieties, but this seldom occurs. My experience is limited to one instance, the fruit being superior in every respect to the parent; more frequently degeneracy is the case. Secondly, by inarching or grafting by approach. A vigorous plant, called the stock, of suitable size, growing in a pot, is taken to the tree from which a graft is desired, a small branch, the scion, about the size of the stock, is selected, a slice about an inch in length is cut nearly half through, and a similar piece cut from the stock; they are then placed carefully together and firmly bound, usually with cotton lamp wick; a coat of varnish, grafting wax, or moistened clay is next applied. When the scion and stock have united the scion is cut off below and the stock above the graft. After a reasonable time the

little tree is transplanted in its permanent position. The third is known as "gootee." In making a gootee, a ring of bark is removed from a branch, over this a lump of well-tempered clay is pressed. This is kept in place by a piece of calico, cloth, or bass wrapt round it. A gootee pot (a globular earthenware vessel, with a hole in the bottom, through which a cord, having a knot at one end to secure it, is passed) is suspended above the branch and filled with water; the other end of the cord is wound round the gootee, which is kept moist by the water trickling down. After a few weeks the clay will be full of roots; the branch may then be severed below the gootee and planted. The fourth method may be regarded as the best. It is called "flute budding," and is thus described:—"The operation is performed in spring. The plant on which the buds are placed is called the stock, and the branch from which the buds are taken is called the scion. A ring of bark is peeled off the stock just below the terminal bud, and an inch or more, as the case may be. A ring of bark is taken from the scion, containing one or more eyes, and of the same length and size as that taken from the stock. The bark with the eyes taken from the scion is then put on the stock, and it should be so placed that its bud may be exactly underneath a bud on the stock. This bud will attract the sap to the scion bud, and thus promote its growth. After the ring of bark is placed, it is bandaged, and mastic applied to any exposed parts of the joinings. Should the diameter of the scion exceed that of the stock, it is easily remedied by cutting off from the scion a longitudinal strip of bark equal in width to the difference. On the other hand, should the dimension of the tube of the scion not correspond with that of the stock, the difference is made good by leaving on the latter a strip of bark of sufficient width to fill up the space not covered by the tube of the scion. In placing the bud on the stock, care must be taken to make sure that the edges of the bark of the stock and scion coincide all round."

The foregoing is very similar to Mr. Horace Knight's excellent method, which he so lucidly described in the last July and August numbers of this *Journal*. Indeed, I think Mr. Knight's description is to be preferred to the above.

Mr. Knight certainly deserves the sincerest thanks of all mango-growers for making known his process and experience. If others can achieve a like success we need not long have inferior mangoes in Queensland, for every bad tree can be converted into a good one.

Mr. Knight says: "It has been suggested that there is some room for improvements in our mangoes, and the writer is of that opinion also." Undoubtedly there is, and no time should be lost. Even in the West Indies, where so many fine kinds exist, it is thought desirable to import new strains from the East Indies. The following is from No. 24 *Trinidad Bulletin*: "It has been thought advisable to import once more a number of selected varieties from the East, and to this end application was made to the Indian authorities for the best kinds from the various provinces, and cases of plants have been ordered from the Bombay, Bengal, and Madras Presidencies. It is almost certain we do not possess all the types of the various strains of mango grown in the East, and although our number of seedling varieties is legion, yet it is probable the introduction of further East Indian kinds will be of great advantage in the endeavour to improve the strains now cultivated in the Western world."

We are not half as far from India as Trinidad is, and we have frequent and speedy steam communication. How much easier, then, for Queensland to get supplied than the West Indies.

When mango plants are next imported, a trial might be made of branches for grafting by Mr. Knight's method. He says: "Experiments have proved beyond a doubt that sections of the mango-tree will keep good for grafting purposes from three to six months' time, according to variety and to the constitution of the tree from which they are obtained. This gives us the

opportunity to import sections of the most desirable class of tree from any part of the globe with a certainty of their growing when properly prepared and tied on."

May not Mr. Knight be induced to go to India and procure a quantity of branches and plants of the choicest varieties? His doing so would be an inestimable boon to Australia. Branches in Wardian cases or simply in boxes having holes perforated at the sides near the top to admit air might easily be imported. I have in this way received fruit trees from California in first-rate condition, all of which grew; indeed, they could not have been better had they come from Sydney or Melbourne.

I have heard it remarked in Melbourne and in Sydney, "You Queenslanders keep your good mangoes for yourselves and send us your rubbish." My reply was, "This is not so; you have much the same mangoes as are sold in our shops, most of which are poor." Those who make mango growing a business should bestow particular attention on the keeping properties of their fruit, as well as excellence in other directions; also to careful grading and packing. Greater care should also be taken in transit. I have seen cases standing on their side and on end, and very roughly handled. This, I must say, has not been in our market. The carriage of mangoes long distances is a problem that is not yet been satisfactorily solved. I have eaten mangoes in London from the West Indies, and in New Zealand from the Islands; they were wretchedly poor. The cause was probably owing to the necessity for picking them unripe.

I noticed on a visit to the market recently quantities of mangoes being sold by auction; 3s. per case was the highest price realised. I saw a couple of hours afterwards, at a fruiterer's, two cases for which he informed me he had paid 7s. a case. They were certainly a very fine sample, in excellent condition, fairly large, clean, and not over-ripe; he was confident they would keep good a week or more if necessary; he expected to realise 2d. each for all of them. This is an instance of how desirable it is to cultivate only good varieties.

There are various points that go to make a good mango—on the outside, size, form, colour and texture of skin; inside, freedom from fibre, size of nut, and, most important of all, flavour. It is very rare to find all these conditions in the same fruit. The finest-flavoured mango I ever tasted was at the Island of St. Helena, South Atlantic; but it possessed no other condition of excellence, the price it realised was one shilling each. This and other fruit trees were brought to the island by Captain Bligh in H.M.S. "Providence" from Timor and the South Seas in 1792. I never saw a handsomer mango than one grown at Wickham terrace; it was entirely free from fibre, but had an enormous stone, was destitute of flavour and otherwise worthless. In marked contrast was one produced here, of fine form and colour, and without a blemish. It weighed 18 oz., the nut $\frac{3}{4}$ oz.; it was quite free from fibre, and of delicious flavour. The tree is a shy bearer, and is this year without fruit. The specimen described was exceptional, the next being a bad second in size, though equal in other respects.

The nomenclature of mangoes seems to be in a hopeless state of confusion. This is greatly owing to the immense variety we have, and to our ignorance on the subject. I have seen several distinct kinds called the "Bombay." As well may we speak of the strawberry as the "London," simply because it originally came from London, or an apple the "English" because it came from England. Eight or nine distinct varieties are known as the "Apple" and as many as the "Strawberry," though why they are so named it is difficult to tell. They do not resemble the apple or strawberry in appearance, flavour, or anything else. Mr. Parker, who has given considerable attention to the cultivation of mangoes, has this season been fortunate in producing a new variety; it is of peculiar form, fairly large, of good colour, free from fibre, small stone, and of excellent flavour. This mango is so good that it is thought worthy of being named "Bobs."

Horticulture.

THE HUSK TOMATO.

The *Farmer and Stockbreeder* says:—"A new kind of tomato is being introduced into this country (England) and the United States, and, should the plant thrive here as well as in its new American home, it will doubtless be in considerable evidence before many seasons are past. Attempts made on a small scale in the Channel and the Scilly Isles to establish it in the Old World have so far proved eminently successful. The husk tomato comes from Mexico, where it is much prized as a vegetable. It is hardly $\frac{1}{2}$ bigger than a horse chestnut, and is enclosed in a hard skin, which dries as the fruit ripens, and is



readily pulled off. It is never eaten raw in the land of its origin, but is most palatable when properly cooked, and is especially good when prepared as a conserve. In view of the advent of the husk tomato, it is interesting to remember that the ordinary tomato is one of the vegetables which originated in the New World, for it was grown under cultivation in Mexico and Peru when Columbus first crossed the Atlantic. In our illustration the tomatoes held in the hand have their husks on, while those which have rolled on the table have had the husks removed."

ROSE CULTURE.

By A. WILLIAMS, Eight-mile Plains.

Although not indigenous to our climate, there are few countries in which the rose has found a more genial home, and by a careful selection of the best varieties a display of blooms may be obtained throughout the year.

For a situation, a site apart from other plants should be assigned to them if possible, open, but sheltered from high winds, and not surrounded by trees, as closeness has a tendency to cause mildew and other diseases.

They adapt themselves to almost any soil, but that which is specially suited to them is a deep loam of a greasy nature. If such is not to be obtained, the best must be made of the conditions at hand. If the land is a strong retentive clay it should be thoroughly drained, as in no case will the cultivation of the rose be a success where the drainage is at fault.

Stiff, heavy soils may be rendered quite friable and their fertility greatly increased by burning in dry weather. To do this, all that is required is to break up the ground into a fallow, and, when fairly pulverised and dry, by the aid of a little wood or grass and the whole properly arranged, the consistency will be quite changed from a stiff unworkable clay to a free and open condition. It is essential in planting that the habit of the variety should be understood, as the tender and more delicate kinds are often crippled, as it were, through being planted along with their more robust and vigorous relatives.

After planting give a good watering, and a little mulch will also be an assistance. Should any of the plants have become shrivelled in appearance through exposure or careless packing, they will soon recover if placed lengthways in a trench and covered with about 3 inches of soil and well watered. In three or four days they may be taken from the trench and planted with safety.

Pruning forms an important part of rose culture. Some classes require hard cutting, and others little or none at all. The plants should be in a state of rest, and the chief object of the pruner should be to promote young growth from the base, bearing in mind that good flowers are only produced once on the same wood.

All weak and exhausted wood should be removed, and the centre of the plants be kept open. Notwithstanding all that has been adduced in support of planting roses on their own roots in preference to those grafted or budded on to a strong stock, there are a number of varieties amongst the Hybrid Teas and Polyanthas especially that are materially assisted both in imparting a stronger growth and by bearing finer blooms by budding.

Roses that have been either budded or grafted have a tendency to sucker from the stock at times, particularly after transplanting. These should be removed as soon as they make their appearance.

HYBRID PERPETUALS.—This is a most beautiful class, and those which have been proved suitable to our climate cannot but be highly recommended, as they include all the rich crimson and pink varieties which make such pleasing contrasts to the yellow and white teas. The following are a few of the varieties that have succeeded best, viz.:—A. K. Williams, carmine red; Captain Maynard, scarlet crimson; Comtesse de Sereyne, flesh colour; Duc de Rohan, red shaded with vermillion; La France, pale peach; Earl of Dufferin, velvety crimson.

HYBRID TEAS.—This class, which is of but recent origin, is continually being added to, and furnishes us with some of the finest and most beautiful exhibition varieties. The majority of them require pruning very sparingly, but they have a tendency to produce two or three times the quantity of flowers the plants are able to sustain. They are much benefited by thinning, more especially when show or large specimen flowers are desired. A few of the best varieties are:—Bessie Brown, creamy white; Climbing Mrs. W. J. Grant, bright rosy pink; Countess of Pembroke, soft satin rose; Kaiserin Augusta Victoria, cream shaded with lemon; Grace Darling, creamy white shaded with peach; Augustine Malem, rosy carmine.

TEA AND NOISETTE.—These classes are easily distinguished by their beautiful foliage and dwarf spreading habit of growth. They furnish all the different shades of yellow wanting in the Hybrid Perpetuals. The climbing varieties are of very vigorous growth, and include some of the best in this section. They require much more space than the dwarfs. Half-a-dozen beautiful varieties are—Muriel Grahame, pale cream flushed with rose; Nephitis (climbing), pure white; Souvenir de T. Levet, dark crimson; Sunset, deep apricot; White Maman Cochet, white tinged with blush; Madame Cusin, violet rose.

POLYANTHAS.—This class is of special interest on account of their dwarf habit and miniature flowers. They are most abundant bloomers. They require but little pruning, but have a tendency to become overcrowded.

New varieties are being continually added to each section, either by raising from seed or sports. A few of the leading novelties this year in England are thus described:—Corallina (Tea), deep rosy crimson, beautiful in the bud, and very free flowering; Georges Schwartz (Tea), deep chrome yellow, large flowers of good form, a lovely and distinct colour; Lady Clanmorris (Hybrid Tea), creamy white, with delicate salmon centre distinct and highly perfumed; Lady Mary Cory, deep golden yellow, large-sized blooms, and very freely produced; Liberty (Hybrid Tea), brilliant velvety crimson, very free flowering, and distinct in every way; Madame Ravary (Hybrid Tea), beautiful golden yellow, long pointed buds; Monsieur Burnel, beautiful rosy peach, base of petals yellow, large, full, and imbricated form; J. B. M. Camm (Bourbon), pale salmon pink, flowers large and full; Ulster (Hybrid Perpetual), bright salmon, flowers of immense size, splendidly formed, a distinct and superb variety.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND, No. 7.*

By HOWARD NEWPORT,
Instructor in Coffee Culture.

CLEARING, STUMPING, DISTANCE APART OF TREES, AND LINING.

CLEARING.

Having got the nurseries in full swing and the land and locality for the coffee selected, the felling and clearing must be attended to. The method of clearing for coffee in no way differs from the same work for any other staple, and so need not be detailed here. I may add, however, that, should any logs remain unburnt, the planting of coffee may still be proceeded with, though the logs should, if possible, be rolled so as to lie across the slope and between the lines. If done by contract, this work will cost from 30s. to £4 or £5, according to the timber and undergrowth. From want of experience or carelessness it may, however, be made an exceedingly expensive work. The time of year in which to fell is also much the same in all cases. In coffee, the object is to have the land cleared in time to allow of pitting in January, or earlier if showers are obtained, and admit of planting as soon as the wet season definitely sets in—usually about February. If the nurseries are planted up by June, there should be time between then and February to get the clearing ready to receive the plants.

STUMPING.

I have already touched upon this matter in the *Queensland Agricultural Journal* for March, 1900, p. 213—"Grubbing." I am frequently asked whether it is necessary to stump land for coffee. It is not absolutely necessary, but is undoubtedly a good thing, if it can be afforded, not only to remove all stumps, but to plough over the land two or three times before planting.

The advantages and disadvantages of the two systems are as follow:—Of stumping, the advantages are—possibility of cheap weeding by means of horse-scuttling for three years or so; better worked soil; less possibility of grubs, borers, or beetles in the coffee; no damage to the plants from decaying roots; and cheaper pitting. The disadvantages are—the cost, which will run from £3 to £7 or £8, or even more, per acre, according to the number of stumps and nature of the timber; and a loss of nitrogen and humus from the excessive burning involved.

The advantages of not stumping are—cheaper and quicker opening, and retention of a greater percentage of nitrogenous matter and humus. The presence of stumps sometimes makes no difference to the growth of the coffee at all. The disadvantages are—inevitable hand-hoeing from the commencement (just when heaviest); possibility of grubs, beetles, &c., in the clearing; possible, though slight, disadvantage to the trees from the presence of roots of the timber trees; and, as a rule, more expensive pitting.

Unless the land is ploughed or dug over, however, all the roots will not be removed by stumping, though they are killed. In heavily-timbered country, the cost becomes prohibitive, and the removal of stumps and roots or the digging or ploughing of the land is not essential to the success of coffee. Stumping and ploughing are seldom resorted to in any country in coffee clearings, but, being generally feasible in Queensland, may be taken advantage of where possible.

* This article should have been issued immediately following No. 3, that appeared in the *Queensland Agricultural Journal* for April, 1900, had time and work allowed.—H.N.

DISTANCE APART.

Before lining and pitting can be proceeded with, the distance apart that the trees should be, must be decided upon. It is a much-debated question, and no hard-and-fast rules can be laid down in the matter. The question of wide or close planting hinges on many contingencies, and must be decided by each grower on his clearing.

The points to be considered are—room for the tree to grow to a good size on the one hand, and economy of space to prevent the useless cultivation of ground on the other, and, besides this, the exposure to wind and cold, and quality of soil of the field, and speedy covering of the ground. It is an old idea that trees on poor soil need to be planted further apart than on rich soil. It has been found by experience that poor soil will not grow any larger trees when planted wide than when close, and ridges and weak patches are therefore planted closer than rich fields, to cover the ground, conserve the moisture, and save weeding. The quality of the soil must be taken into consideration in deciding the question, for it is obvious that what would be close planting in a rich pocket would be wide on a poor patch. As a general rule, therefore, the richer the soil and more protected the spot, the wider the planting may be made with success. Again, not only does too wide planting allow of undue weed growth, and cost more to keep clean, but excessive evaporation takes place in dry weather, and the ground becomes hard. It is a great advantage to have the ground covered as soon as possible. Too close planting, on the other hand, is almost as bad, as it draws up the trees at the expense of lower primaries, but it is better to err on the side of close planting, for it is obviously easier and cheaper to prune back or even cut out trees than to subsequently have to plant between the rows or to weed and cultivate for an indefinite period.

A coffee-tree will attain a spread of 6 to 7 feet in from three to five years, but will often take ten years to cover 10 to 12 feet, and on poor soil perhaps never do it. I am, therefore, of opinion that 8 feet $\times$ 8 feet is as a general rule the widest distance at which *C. arabica* may be planted in North Queensland, and 6 feet $\times$ 6 feet the least distance apart, with success. In exposed, cold, or windy situations coffee trees should be planted at the lesser distances, irrespective of soils, not only to prevent wind getting under or between them and damaging them, but because, other conditions being equal, where it is windy or cold the growth is less. It is better, therefore, to line off according to the requirements of each patch or field, at the sacrifice of appearance, than to retain uniformity at the expense of the trees. The following table gives the number of trees to the acre, on the square, at the distances mentioned:—

6 feet $\times$ 6 feet = 1,210	7 feet $\times$ 7 feet = 881
6½ feet $\times$ 6½ feet = 1,031	7½ feet $\times$ 7½ feet = 730
8 feet $\times$ 8 feet = 680.	

LINING.

On land that has been ploughed, the lining can be very simply done by counting the furrows, or, if harrowed, by running the plough over it again at the required distances and crossing it. The pits are then made where the furrows intersect each other, and a great deal of the cost and work of pitting can in this way be saved. If the land has not been worked, a supply of stages of scrub wood about 2 feet long and 1½ to 2 inches in diameter will be required. Since it is better not to have split timber for these stakes, or to remove the bark, they will be easily and cheaply obtained. Besides these, a chain or line is necessary—any rope well stretched, or even fencing wire, will do. Ratlin is serviceable and lasting, and rope is generally more easily handled than a chain or wire. On this the distances required are marked; a piece of rag or cloth is easily seen and easily attached. In rope it is better to insert than tie on, and so prevent shifting.

There are four methods of lining more or less used in coffee-planting:— (1) The Square ; (2) the Diagonal ; (3) the Hexagonal or the Triangular ; (4) Quincunx. Surveying instruments, such as a theodolite, are extremely useful ; and if a grower can obtain and use one, he will not only have exact lining, but will need no instructions. Lining is not so important a matter as to need such elaborate apparatus, however ; and I therefore propose to explain only the rough and ready methods of laying the guiding lines. In all cases, a base line must be marked off, and an effort should be made to get this and subsequent leading or guide lines also, if possible, on level ground.

In *Square* planting, which is the method commonly adopted, the difficulty usually is to get the guide line at a correct right angle with the base line. If not right to start with, subsequent trouble is inevitable.

A right angle may be obtained by tying the line at the first mark to the first peg of the base line, the tenth mark on the line (nine spaces) to the fourth peg of the base (three spaces), and holding the fifth mark on the line to stretch

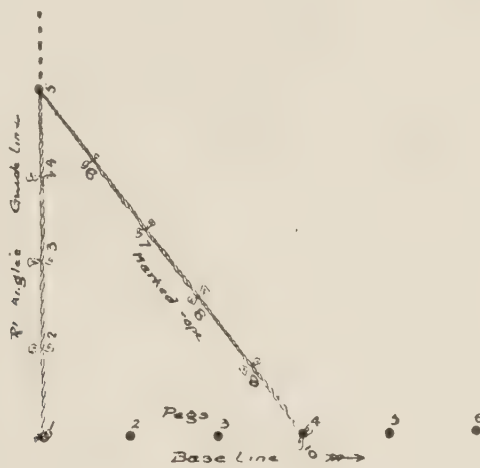


Fig 1

To obtain a Right angle in Lining

the slack line taut in both directions. A peg at that spot will then be at right angles to the first peg of the base line ; this must be carefully done, however. The method experience has taught to be the surest is to guess a square of equal sides and prove or correct it till the diagonals measure the same. The feet and inches do not matter, but, if the length from one corner to the

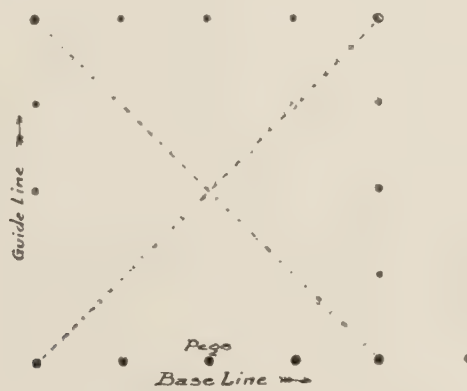


Fig II

Square Lining The diagonals of the figure, to be equal to each other, & the sides equal

diagonally opposite one is not equal to that between the other two corner pegs, the figure cannot be right-angled. Once the square is obtained, one side may be lengthened to form a guide line, on which, with the base, a larger square is formed. The sides should then be pegged off, when the subsequent filling in will be comparatively easy. In ordinary square planting, the exact distances, such as 6 feet $\times$ 6 feet, 7 feet $\times$ 7 feet, or 8 feet $\times$ 8 feet, are usually taken.

In diagonal planting, the object is to have the trees in every other row opposite the spaces in the base line. This gives the trees individually a little more room, or, rather, leaves less ground unused, but a few trees less will be obtained to the acre. The lining for this method of planting may be done in the same way as the square, and the alternate rows guessed at, but to be correct *two* guide lines from the base line are advisable. The second guide line is made

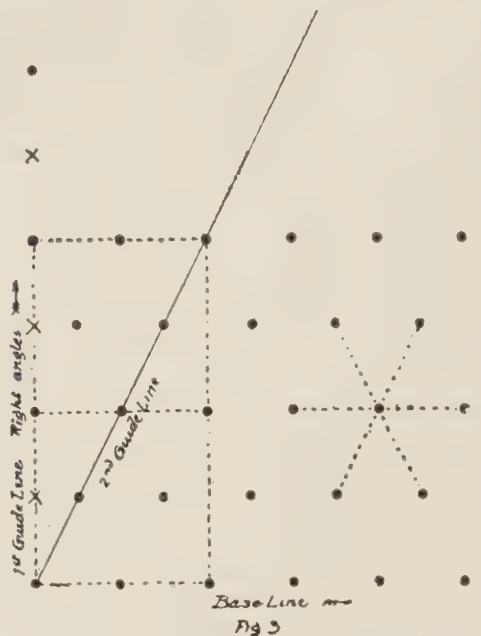


Fig 3
Showing two Guide Lines for Diagonal Lining

by taking the diagonal from *two* squares, as per sketch. A mark on the lining rope is then made to fall on the second guide line wherever it crosses it. The second guide line need not have the distances marked on it, and should be allowed to lie until the square is filled in. For this, the equal distances are usually taken as in the square planting.

There is also another method of diagonal lining sometimes used, called the "False" diagonal, in which the odd distances, such as $6\frac{1}{2}$ feet $\times$ 6 feet, or $7\frac{1}{2}$ feet $\times$ 8 feet, are taken; the base line always having the greater distances. This is, however, irregular and somewhat difficult, and has few advantages.

The third system is the easiest and best method of lining. It is used less often than the square method only because it is imagined to be more difficult to lay out, whereas, in reality, the more or less difficult right angle being eliminated,



Fig 4
Hexagonal or Triangular Lining Equilateral Triangle

it is easier. It gets its name "Hexagonal" from the space allotted to each tree, this figure allowing of no waste; and "Triangular" from the method of laying the guide lines from the base. Two lines or ropes are required, marked as before mentioned, and of equal length. The base line then having been laid and pegged with one of them for its full length, the end of one line is fastened

to the first peg of the base and the end of the other to the last peg, and the two lines are drawn taut, forming a triangle. The sides are then pegged according to the marks on the ropes and the triangle filled in, when the pegs will be found to be perfectly regular, having all the advantages of the diagonal principle, and yet making every tree equidistant from its neighbour on any side.

Any side of the triangle may then be taken to form the base of another, and triangles of any size may be made to suit the contour of the field, but must always be equilateral. For this method the equal distances are used, of course, and from 5 to 6 per cent. more trees will go to the acre than on the square.

The Quincunx.—This is a somewhat irregular method, and is only used when a field is designedly planted wide, and the fifth tree, planted between every four (as the name implies), is intended to be eventually cut out, or a field is found to be too wide planted. In either case it is easier to guess or measure from tree to tree than to line off at first for it. Should it be desired to line off in the first instance for quincunxing, it is best to complete the lining on the square first and make a separate process of putting in the fifth pegs. Diagonal lines should be drawn between the four pegs in each corner of the filled-in square and the lines stretched from these. The same lines may be used, as the distances will be exactly the same as the previous lining on the square will have been.

Finally, a word or two about lining in general. Always endeavour to get the base line not only on level ground, but *across the slope*. This is more important than making it parallel with the fence or road. In lining at odd distances, such as 6 feet $\times$ 7 feet or $7\frac{1}{2}$ feet $\times$ 8 feet, the base line should always have the greater distances, so that, when planted up, the coffee will present the wider spaces to the direction of most of the works—*i.e.*, up and down hill.

A well-lined place looks well, but it does not pay to waste time in getting it too exact. A little deviation from the straight is not noticeable when the coffee is old, and the object of lining is to ensure your making the most of the ground and for easier subsequent working, rather than for appearance.

Should a rise or depression of any moment exist in a clearing, exact lining will be impossible, for either the distances must increase or the lines be crooked. In such cases, sacrifice appearance rather than your distances. On large areas, lining off with marked ropes is quick and cheap, but on small gardens it is sometimes done with two sticks of the required length tied together at one end. The end of one stick is placed at a peg in the base line and the end of the other to a peg in the guide line; the spot where the sticks are connected then indicates the place for the next peg, and so on. This is also useful for odd corners.

THE ALGARROBA; OR, MESQUIT BEAN (*Prosopis Juliflora*).

By G. B. BROOKS,
Overseer, Kamerunga State Nursery.

In the April number of the *Journal* an article was submitted on the above tree pointing out its useful qualities, and making special mention of its value as a stock feed for the drier portions of the State. This article resulted in the receipt of numerous applications for seed from all parts of the State. The crop being the first borne by the tree in this nursery, the supply of seed was exhausted after the first hundred or so of requests had been complied with. It was to be regretted that there was not sufficient seed to supply all, but the tree is now bearing again, and the forty odd applicants whose requests had to stand over will be shortly supplied. There will be seed to spare beyond this, as the crop promises to be a good one.

Since the acclimatisation and propagation of this valuable tree in Queensland has been made known by means of the above-mentioned article, several gentlemen have come to see it, and have been unanimous in testifying to its value from their experiences of it in other countries.

It would seem that in one or two instances a little difficulty was experienced in the raising of the seedlings. The few following hints regarding germination of seed and propagation of seedlings might, therefore, be of general interest:—

In sowing the seed, a loose open soil made up of equal parts of rich loam or vegetable matter and sand is the best. The seeds should be only just covered, for if planted deep, especially in the cold weather, they will frequently lie dormant for some considerable time. In such cases, when the soil is stirred up, the seed will readily germinate in the spring or on the approach of warm weather. This is a point that should be noted, as seeds so planted, especially in the cooler portions of the State, are frequently looked upon as unfertile if they do not speedily show signs of vitality.

After germination, the principal thing to guard against is over-watering. Some cases have come to notice where the young seedlings have damped off, but this was in the Northern coastal districts, and in moist hot weather. In the cooler portion of the State this need not be feared, however, unless obviously over-watered. There is no mistaking young seedlings, for, like many other plants of this family, they raise the seed itself above ground, which remains there for some short time until the seed lobes open, the typical *Algaroba* leaf not making its appearance for some days subsequent to this. The young seedlings grow very long tap roots; plants of 4 inches in height have been found to have tap roots of fully 18 inches in length. This necessitates careful handling, if transplanting is contemplated. If the seeds are not sown where the tree is to permanently remain, shallow boxes or tins, say 6 inches in depth, filled with the compost already referred to, are preferable to ordinary garden beds. This method prevents the tap root from going too deep, and encourages a fibrous growth of root without detriment to the plant. On transplanting seedlings grown in this way, care must be taken in separating the roots when entwined, which will occur if the seed has been at all thickly sown. Otherwise the transplanting of seedlings thus propagated is much safer than that of those grown in garden beds, and, if carefully done, very few failures will result.

SUGAR-CANE EXPERIMENTS IN BARBADOS.

The *London Times* weekly edition gives the following particulars of important experiments on sugar-canes of different varieties on different soils and in varied climates on the island. The experiments have especial interest for Queensland sugar-planters, as Queensland creole was amongst the fifteen varieties chosen, and came third on the list above the standard with 4,404 lb. of saccharose and 2·69 tons of sugar per acre:—

“During the past season important experiments have been conducted in Barbados by Professor d’Albuquerque, honorary consulting chemist to the Imperial Agricultural Department, and Mr. Bovell, superintendent of the Botanic Station, to test the commercial value of various descriptions of seedling and other sugar-canes, with the object of assisting the planters in selecting the canes most suitable and profitable. The extreme varieties of soil and climate typical of comparatively large areas in Barbados are high red soils and low black ones, and between these two come every intermediate variety, so it is obvious that some canes would be more productive in one locality than in another. The cane most favoured by the planters recently is the white transparent, and this has been adopted as the standard for comparison. An arrangement was made by which the canes to be used in the investigation were to be grown, not on experimental plots in the Botanic Gardens or in artificially prepared soil, but on seven different estates distributed over the island, ‘grown by the planters themselves under exactly the same conditions as other canes. There was nothing exceptional in their treatment. Hence the results may be regarded as fairly typical of the locality in which they were grown.’ Fifteen selected varieties of sugar-cane were compared on five black soil estates, and ten varieties

on two red soil estates. Each variety was allotted a plot of 100 holes, and at nearly every station there were two series of the varieties, so that there were two plots (duplicates) of each variety, serving to show at each station, on the field chosen, the variation to be expected with each variety from one part of the field to another. Finally, the crops when reaped had to undergo identically the same treatment at the hands of the investigators, and the results have proved extremely interesting.

“Valuable tables have been prepared showing for each variety in the black and the red soils separately the quantity, in tons per acre, of canes and tops; the percentage of juice produced by mill; the pounds per gallon of saccharose, of glucose, and of solids not sugar; the quotient of purity; the juice, in gallons per acre; the saccharose, in pounds per acre; and the sugar, in tons per acre. Taking the last two only, we find in the black soil experiments that while the standard white transparent yielded 4,528 lb. of saccharose and 2.41 tons of sugar, seedling B.147 yielded respectively 6,067 lb. and 3.01 tons, B.347 coming next with 6,012 lb. and 2.90 tons, followed by B.208 with 4,988 lb. and 2.83 tons; three other canes—Queensland creole, Jamaica cane, and B.254—being rated above the standard. The Bourbon cane made a very poor show, being the last on the list with only 841 lb. and 0.47 ton. On the red soil the order of merit was changed, B.208 leading with 6,239 lb. and 3.34 tons; B.156, which was tenth on the black soil list, being second with 6,591 lb. and 3.32 tons; and B.147 third, with 6,794 lb. and 3.31 tons. Combining the results for the two soils, the standard white transparent, with yield as above stated, becomes eighth on the list, B.147 being in the first place with 6,291 lb. and 3.10 tons, B.208 following with 5,443 lb. and 3.02 tons, Queensland creole third, with 4,404 lb. and 2.69 tons, and Jamaica cane fourth, with 5,001 lb. and 2.67 tons. Another similar table shows the results obtained on three black soil estates with B.147 and white transparent, the former proving by far the better cane, producing 6,999 lb. and 3.47 tons, against the standard’s 4,527 lb. and 2.41 tons, or in favour of B.147 to the extent of 55 per cent. in saccharose, and of 44 per cent. in the mean yield of marketable sugar—in other words, a gain of more than a ton of sugar per acre. With such results as these there is no hesitation in deciding on B.147 as the best all-round cane for Barbados; but the Imperial Commissioner of Agriculture, knowing from experience how reckless the planters have been in the past in going in for extensive cultivation of a particular cane because it had been profitably grown somewhere else under totally different conditions of soil and climate, advises the planters, in the first instance, to select three or four only of the most promising canes, which have now been experimented with, and which may be likely to suit their district, and, finally, to adopt the variety which steadily stands the test of local conditions. With 100,000 acres of land under cultivation it is obvious that, if the introduction of an improved variety of cane insures an increased yield of even only a quarter of a ton of sugar per acre, the planters and the island generally would derive immense benefit from the change.”

FERTILISING TROPICAL PLANTS.

In applying fertilisers to tobacco, wait till the plants have been set out for about a fortnight; then remove some of the earth about the plant, and put into the hollow thus formed a compost mixed with artificial fertilisers, cover up and slightly water if necessary. When the soil is pervious and rich in humus, the best composition of artificial manure for a tropical climate is 180 lb. sulphate of potash, 45 lb. of high-grade superphosphate, and 135 lb. Chili saltpetre (nitrate of soda)—a total of 360 lb. per annum.

In temperate climates the most invigorating compound is found to consist of 180 lb. sulphate of potash, 180 lb. Thomas’ slag, and 180 lb. Chili saltpetre.

A compost heap is easily made, and the value of composting lies in rendering available as plant food all sorts of waste products of the house,

kitchen, farm, stable, garden, &c. Both vegetable and refuse animal matter, such as dead animals, spoiled meat, will by judicious management be turned into valuable plant food. Kitchen and bedroom slops should be sent to the compost heap. Constant forking over will hasten decomposition. The heap must be kept under cover to prevent leaching in rainy weather, and loss of valuable constituents through the agency of the hot sun and drying winds.

Most of the coffee-planters of Queensland carry on the cultivation on the rich scrub soils of the coast, which last for years without the addition of manure; but in heavy clay or very poor soils manuring by nitrogen-gatherers is necessary. On such lands, spread the stable manure and plough it under, and plant the seed, if green-manuring is to be practised, directly before the beginning of the rainy season. The artificial fertilisers, if used, should be spread broadcast and ploughed in—if the land is level, before, and, if hilly, after the rainy season. If the plants appear weak, use more stable manure; if they are strong and healthy, do not give much manure containing nitrogen, such as stable manure and oilcakes—use only artificial fertilisers. On heavy soils and poor land, supply from 1,800 to 2,700 lb. caustic lime every sixth year, or from 9,000 to 18,000 good marl per acre. If neither lime nor marl are procurable, use the following mixture:—385 lb. Thomas' slag (16 per cent.), 225 lb. sulphate of potash magnesia, 90 lb. Chili saltpetre—total, 900 lb. per acre per annum. If there were lime, then apply—405 lb. superphosphate (16 per cent.), 225 lb. sulphate of potash magnesia, 90 lb. Chili saltpetre—total, 720 lb. per acre per annum.

Sugar-cane may be manured with megass ashes. Fertilisers containing chlorine should not be used. Apply, once in eight or ten years, from 1,800 lb. to 3,600 lb. caustic lime. Never use fresh stable manure; use it only if mixed with soil. Cow pea, velvet bean, and castor-oil plants are excellent for green manuring. On deep soils, not too rich, containing much lime, apply annually, per acre, 270 lb. superphosphate (16 per cent.), 90 lb. sulphate of potash, 90 lb. Chili saltpetre; total, 450 lb.

For maize, clayey soils should be avoided. The best soils are deep loams, also sandy soils rich in humus, and not too dry.

If planted for harvesting for grain, apply 270 lb. superphosphate (16 per cent.), 270 lb. kainit, or 65 lb. muriate of potash and 180 lb. Chili saltpetre—total, 720 lb. per acre per annum. If planted for fodder, the Chili saltpetre may be omitted. The richer the soil the more necessary it is to fertilise with lime.

Spread and plough in the kainit and superphosphate directly after having harvested the preceding crop; apply the saltpetre only when the young plants are from 7 to 9 inches high. Keep the soil stirred afterwards, as the saltpetre is apt to form a crust.

For mountain rice more potash is required than for water rice. Sow on light, somewhat sandy soil, spread the fertiliser broadcast, and plough it in two weeks before sowing the rice. Such a fertiliser may be compounded of 270 lb. superphosphate (16 per cent.), 360 lb. kainit, or 85 lb. muriate of potash and 90 lb. Chili saltpetre—total, 720 lb.

Ginger should be planted on light, loamy, sandy, pervious soil, rich in humus. If the soil is dry, watering or irrigation must frequently be practised. Spread and plough under the following mineral fertiliser:—405 lb. superphosphate, 225 lb. sulphate of potash magnesia, 90 lb. Chili saltpetre—total, 720 lb. per acre per annum.

The use of nitrogenous fertilisers is of great importance to a ginger crop. The above fertiliser should be applied to a soil rich in lime. Where lime is wanting, substitute 585 lb. Thomas' slag for the superphosphate.

If cotton is grown on poor land, it needs to be abundantly fertilised. The best soils for this crop are sandy, loamy, and deep limy soils. The limy soils of West Moreton are eminently suited for cotton-growing, and there fertilising is hardly necessary. Heavier soils are good if supplied frequently with lime and substances producing humus. When the mechanical condition of the soil is

bad, being compact and heavy, humus must be applied in the form of stable manure. The best artificial fertiliser is a mixture of 360 lb. kainit, 360 lb. superphosphate, and 18 lb. Chili saltpetre per acre for each crop. Cotton-seed meal is a very valuable fertiliser, but, as it is very much esteemed as a cattle feed, it is rarely used otherwise. Spread the mineral fertilisers, and plough them under deeply before sowing. Fertilisation by green manuring with leguminous plants is very important. Sow pea or bean seeds after the young cotton-plant is well-developed and the cultivation is completed. Plough in the green crop after having harvested the cotton.

Ramie.—As a ramie plantation is only replanted once in about twenty years, abundant fertilising is necessary. Make a compost of the old leaves of the plant and mix with it 540 lb. kainit, 180 lb. superphosphate, 180 lb. Chili saltpetre—total, 900 lb. of mineral fertiliser per acre per annum. This should produce a quick growth of stalks. Applications of common salt also are advantageous. Spread fertiliser at the end of the rainy season after the ramie is harvested and work in the field has become possible.

RUBBER LAND CONCESSION IN PERU.

Reports state that the Government has granted a ten-year concession of 2,000 estradas on the banks of the Combapata River, for developing the rubber trees there, to Geo. Fair and Albert Lee, American citizens. A railroad which runs from the seaport town of Mollendo to Puno, on Lake Titicaca, has a branch line extending north to within about 35 miles of the Combapata River. This branch was to run north to Cuzco, in Southern Peru, but work on it was interrupted by the war between Peru and Chili. Its completion will bring the line to within a few miles of the India-rubber trees which have been conceded to Lee and Fair.—*Engineering News*.

CASSAVA.

Mr. J. Harding, Geraldton, has shown us a sample of cassava starch manufactured by him, which apparently leaves nothing to be desired on the score of grain and pure colour.

Apart from the bitter and sweet cassava varieties of the East and West Indies, there are numerous very important varieties of cassava under cultivation in Columbia which are extensively used in lieu of, and generally in preference to, potatoes, cooked in the same manner.

Cassava is peculiarly adapted to semi-arid regions. The *Encyclopædia Britannica* says, in an article on India: "It has been estimated that, in the absence of irrigation, the rice crop requires an annual rainfall of at least 36 inches, and an Indian province requires an average fall of not less than 50 to 60 inches in order to grow rice as a staple crop." The Columbian varieties of cassava will flourish with a rainfall of only 14 to 16 inches, and can stand a six-months' drought. On the other hand, there are varieties which can stand a most abnormal rainfall.

Mr. Robert Thomson, in an interesting letter on the subject to H.M. Secretary of State for India, says that one man can cultivate six acres of this plant, the yield of which amounts to 60 tons of tubers per annum, at a cost of 10s. per ton. Thus, 19 lb. of a precious article of food can be raised at the cost of 1d. Accordingly, one man cultivates sufficient to support 100 persons for a year. One hundred square miles of cassava grown in scattered plots would produce food for 1,000,000 persons. In Ireland the area under potato cultivation has, in past times, reached 1,933 square miles. Cassava roots can be profitably used as cattle food. Immense quantities of starch and farina

can be produced from the tubers. Mr. Thomson considers the bitter and sweet cassava to be merely varieties of the same species. Some varieties grow in rich damp soil, others in exhausted, impoverished soil, from the hot plains to an elevation of 6,000 feet above sea-level.

The cassava plant is not unlike our well-known castor oil plant, of which it is a near ally. The farina is obtained from the roots, which often weigh 30 lb. for a single tuber. The root of the "sweet" cassava is perfectly wholesome to eat without any preparation, being commonly used as a vegetable, but being deficient in farina is not nearly so much cultivated as the "bitter" variety. The roots of the latter are extremely poisonous, but the poisonous ingredient is entirely confined to the juice, and as it is very volatile it is easily dissipated by the process of roasting, the smallest remnant of the poison being driven off by drying the flour on hot plates. Some years ago we grew a plot of bitter cassava at "Ormeau," Pimpama, and it happened that when the crop was ripe a gentleman from Brazil was staying there. He undertook to prepare some cassava flour. The roots were dug, washed, and peeled; they were then crushed, and the meal was placed in a coarse sugar bag under heavy pressure, water being freely passed through it. This water flowing into a tub carried with it the fine white starch. It was allowed to settle, then drained away, and the starch was dried on a sheet of iron, by which means every particle of poison was driven off. The heat caused the fine grain to swell, and when cooked in the form of a pudding we had a perfect tapioca pudding.

The planting and cultivation of the cassava are as simple as for arrowroot. The cuttings of the stem, about 1 foot long, are laid in the furrow like sugar-cane plants, and covered in the same manner. The plant grows to a height of from 4 to 6 feet. Only the tough wood of the full-grown stems should be used for cuttings. In about eight months after planting, the tubers are ready for digging, but they will take no harm if left in the ground for a year and taken up as required. Here we have a plant which should prove a most valuable adjunct to our farm crops, from one end of the State to the other. The price of tapioca in London is now from £16 to £20 per ton.

TOBACCO IN FLORIDA.

In cultivating tobacco in Florida, the endeavour is to use the best elements of the American, the Cuban, and the Sumatran methods, in which the American method, being the basis of all the methods, largely predominates, the Cuban and Sumatran hand methods finding little favour with Americans, where horse labour can be substituted.

The Seed Beds.—The seed beds, whether made in the forest or upon the farm, are thoroughly burned, enclosed with plank or skinned poles, and covered with cloth. After sowing and firming, the seed beds are watered, and, in the absence of suitable rains or of sufficient moisture in the soil to keep the surface of the beds damp, the beds are watered with a watering-pot or other sprinkling devices.

Planting.—The time for planting tobacco in Florida varies considerably. In the extreme southern portion of the State transplanting begins in February; in the latitude of Ocala, March; and in the more northern portions of the State, April.

When the plants are from 3 to 6 inches high, the length depending largely upon whether the plants are stocky, as in thinly sown beds, or slender, as in thickly sown beds, they are set in the field, which has previously been put in good tilth by ploughing, fertilising, and harrowing.

Because of Florida's leachy soil, being mostly fine quartz sand, fertilisers are applied in the rows, mixed thoroughly with the soil with a scooter or shovel plough and a furrow thrown on it in both ways with a small plough or twister.

Commercial fertilisers, which are ordinarily employed, being injurious to the plant roots, are applied from two weeks or a month before the plants are set, so that they may digest and be thoroughly incorporated in the soil.

Sometimes home-made fertilisers of muck, lime, wood ashes, and stable manure are applied in the same way as commercial fertilisers.

Before taking up the plants from the plant bed, the bed is watered thoroughly, so that some of the soil will adhere to the roots. The plants are taken up carefully with a pointed stick or fork, generally in the morning when the dew is on them, placed in shallow boxes, roots together, and covered with damp cloths and placed in a shady cool place until planting time. Where there is sufficient labour at hand, the plants are taken up as the planting proceeds. Early in the season plants are set at any time of day; later on, afternoon; in summer, late in the evening.

Transplanting machines are used by a few planters, but, as a rule, the plants are dropped in the rows by hand, the desired distance apart depending upon the variety and strength of the soil. The rows of Havana tobacco are usually made $3\frac{1}{2}$ feet apart, though occasionally only 3 feet, the plants being set all the way from 12 inches, on fertile or fertilised fields, to 18 inches on thinner soil. In field crops—corn, for instance—the poorer the soil the more standing room is given to the hill. Practical farmers adopt the same rule in growing tobacco.

For Sumatra tobacco, the rows are made 4 feet apart, and the plants are set from 12 to 16 inches in the rows. The customary method of making holes with a dibble to set plants in is employed; sometimes, too, holes are made with a stick about 4 feet long, the holes being made as the hand walks along the row. Generally the earth is firmed about the roots with the dibble; the more careful do this with the hands. If the field is dry, the holes are watered before setting the plants, and afterwards when necessary until the plants establish themselves. Replanting is done as soon as missing plants are discovered.

From the time the plants are set, the rows are gone over in the early morning to destroy the cut worms until the plants are large enough not to be injured by them. When the plants have become established—the time varying from one to two weeks, depending on the season, the vigour of the plants, and the care with which they have been set—they are hoed and some fresh soil thrown to them with a sweep or cultivator run shallow. After this, the plants are worked as often as necessary to keep the field clean and the plants thriving. The soil is always thrown to the plants, and the rows hoed between the plants where necessary to destroy weeds and grass.

The cultivation differs from that in the north, only in that in the north the cultivation ceases when the plants are topped, while in Florida it does not. The cultivation is continued, and a sucker crop grown. The practice is to leave a thrifty sucker to develop, as near to the roots as possible, and when the plants are cut these suckers develop with remarkable speed. This sucker crop is mainly a filler crop, but it produces a good percentage of wrappers also.

When the bloom-bud appears, the plant is topped, the amount of topping depending upon the strength of the plant, anywhere from nine to fifteen leaves being left on Havana, and as much as twenty or more on Sumatra. In fall crops, the plants are topped low, regardless of the bloom-bud, to hasten maturity, because of the danger of frost in November or December.

Insects.—Worming.—From the time of setting the plants to the time of harvesting the crop, the field is gone over to combat insect enemies. When the tobacco worm appears the plants are wormed early in the morning, from two to four times a week, depending upon the severity of the invasion of the tobacco fly.

For the destruction of the tobacco worm, picking is exclusively followed; for the destruction of the tobacco fly, a solution of a quarter of a pint of syrup, three-quarters of a pint of water, and 1 oz. of cobalt is used. A few drops of this mixture are put into the blossoms of the Jamestown weed, petunia or

datura, in the evening, either upon plants that are favourably located or in blooms that are conveniently placed in the field; a board about 8 inches square, with holes bored in it, being nailed on the end of a stick 4 or 5 feet long.

For the destruction of the bud worm, a mixture of one tablespoonful of paris green to a gallon of cornmeal is dusted upon the buds in the morning, while the dew is on, with some kind of a duster, usually an extemporised baking powder or mustard can, the lid of which is perforated with a small wire nail. This can be used in the hand or fastened to the end of a stick about 18 inches long. Arsenate of lead and other insecticides are also used for the same purpose.

The same insecticides are used in the seed bed when the plants are attacked by insects; sometimes air-slaked lime, to which 2 oz. turpentine have been added to the peck, is blown over the bed, under the covering, with an insect bellows. This drives many of the smaller insects from the bed.

Cutting.—When the leaves begin to change colour from the dark-green to a lighter shade, with faint yellow spots appearing on the leaf, the crop is harvested.

Three methods of cultivating are followed in Florida, each having its adherents. Sometimes all three methods are employed on the same farm, namely:—The original American method of cutting the entire stalk; 2nd, cutting the plant in sections of two leaves, the Cuban method; and 3rd, priming the leaves from below as they ripen. Where the whole plants are cut they are taken to a grassy spot to wilt; frequently they are speared at the butt immediately, and from seven to ten plants strung on a 4-foot lath and carried or hauled on wagons with suitable racks to the barn. Where the plant is cut into sections, the sections are straddled upon laths or poles in the field; when the leaves are primed, they are placed in shallow boxes, face to face, and carried to the stringing-shed, where they are strung on strings of from thirty to forty leaves to the string, which are fastened to a lath with a slot about 2 inches long sawed in each end.

Generally these laths, poles, or rived sticks are 4 feet 2 inches long, but the Cubans use longer poles, frequently as long as 14 feet.

After the lathing by either of these methods, they are placed within the wilting-shed or carried to the barn.

The tobacco barns of Florida are the same as those in general use in America, with the exception that, on account of the humid atmosphere of Florida during a large part of the curing season, the barns are stripped to make them as tight as possible.

Barn Curing.—The sticks of tobacco, as above described, after having been wilted, are hung on the tier poles in the barn. Frequently the tobacco is placed in the barn directly, the wilting depending upon the condition of the weather and the quantity of tobacco in the barn, as the tobacco must cure slowly, and the primary wilting would, in such cases, hasten the curing too quickly.

During the curing, the humidity of the air in the barn is kept as nearly uniform as possible, that the leaves shall not dry too quickly. Occasionally a psychrometer is used to note the humidity; generally this is done by noting the condition of the tobacco. The barn is closed during the day in drying weather and opened at night. When the atmosphere is very humid the reverse is done, and wood or charcoal fires built to dry the air and prevent mould. When wood is used, care is taken to burn nothing but oak or sappy pine, as heart pine imparts an odour of turpentine. When mould makes its appearance, the mouldy sticks are given a sun-bath from day to day until danger from that source is past.

In from three to six weeks after the tobacco is hung in the barn, the cure is complete. Then, when the tobacco is in case, it is tied in hands and packed in boxes to be sold, or subsequently fermented. At this stage, Cubans do not tie their leaves in hands, but tie it in loose bundles about 8 inches in diameter.

and pile these in a close room and cover with cloths. This practice is gaining favour, and much of the Florida tobacco is thus handled. This practice is called "Pilon."

Pilon.—In Spanish, pilon is defined as "a heap." As before stated, in harvesting tobacco the Cubans cut the stalks in sections of two leaves; occasionally a section of three leaves of one grade is cut. These sections are straddled upon poles. These sections vary in time of curing. The barn is gone over occasionally, and sections of uniform ripeness are placed together. When the sections are cured they are taken down and stripped from the piece of stalk, tied in loose bundles of about 8 inches in diameter, and piled in a close room and covered with cloths. About 6 inches of some loose material, such as corn fodder or dried palmetto leaves, is laid down first, and the bundles piled on this bed. If, during this pilon, any moulded stems develop, those leaves are withdrawn and given a sun-bath, and placed in a bundle by themselves, and kept separate from the bulk to prevent dissemination of mould spores.—*Florida Agriculturist*.

A farmer, writing to the *Florida Agriculturist* on his success in growing Cuban and Sumatra tobacco, says :—

I have sold it all—8,000 lb.—for about an average of 20 cents (10d.) per lb. I grew that crop on $10\frac{1}{2}$ acres, and used only 10.00 dollars (£2 1s. 8d.) worth of fertiliser per acre. It cost me only 10 cents (5d.) per lb. to raise it, not counting the use of the land, barns, and sticks, which I owned, and if rented the cost would not have been over 12 cents (6d.) per lb.

This means that the farmer cleared over £16 per acre net profit. Queensland-grown tobacco has at times been sold at from 9d. to 1s. per lb., and we believe the price locally now is about $5\frac{1}{2}$ d. Cannot our tobacco-growers raise a leaf that will produce 10d.? They certainly cannot complain of want of expert instruction. Where, then, does the fault lie?

COFFEE IN QUEENSLAND—AN INDIAN VIEW.

Judging from the frequency of articles and quotations from Queensland journals which appear in *Planting Opinion*, it is gratifying to know that the progress of the coffee industry in this State is being critically watched in India, at least in the Madras presidency, by those who can well claim to be thoroughly up in the subject they write about. *Planting Opinion* reprints several lengthy extracts from the articles regularly published in this *Journal* from the pen of Mr. H. Newport, Instructor in Coffee-growing, and in another article discusses, very fairly, the prospects of coffee-growers in Queensland, concluding as follows :—

"As to the future, Mr. Newport appears to be sanguine. He notes improvement in quality, alludes to sales at from 1s. 6d. to 1s. 9d. per lb. in tins, but he deprecates too much decentralisation in regard to manufacture, fearing that the placing on the market of a large number of brands would depreciate prices. In support of his assertion that prospects are good, he states that high-grade quality is obtainable, and that, in spite of labour competition in other countries, the colony's natural advantages can compete with them. He even states that from the grower's point of view coffee has become the most paying of products, giving a return of 10 cwt., and possibly a 15 to 20 cwt. crop, which even at 6d. per lb. in the parchment would mean £28 gross, or a net return of £15—£20 at least per acre. It should be especially noted, however, that at present coffee in Queensland is mostly regarded as a by-product. It may be that it will yet 'pay' as a staple. Mr. Newport thinks it will. At any rate, his figures will make some of our readers regret that the large acreage in India out of which they can make little or no profit cannot be at once exchanged for even a smaller acreage under coffee in Queensland, where, unless Mr. Newport

errs greatly, land is to be had that will prove responsive to care and knowledge, and yield coffee enough and of a sufficient quality to make good profits a certainty. We shall await with interest his future reports, commenting on the development of the coffee industry in Queensland. It is good to know that there is at least one country where profits are derivable from the cultivation of high-grade coffee."

Let us hope that some Indian planters will come over to Queensland, and bring their experience to bear on coffee-growing here. We can assure them they will be heartily welcome, and that they will have no difficulty in obtaining the necessary suitable land at very low prices, and on payments extended over a series of years. Mr. Newport in no way exaggerates either the excellence of the soil, the suitability of the climate, the healthiness of the plants, or the returns to be obtained. Indeed, we are inclined to the opinion that, without deviating in the least from the truth, he might be more optimistic than he appears to be in his reports. There is no doubt that these reports can be fully relied upon, and that in them Mr. Newport is careful rather to understate than to overrate the average yield of coffee in the North and the prices obtained.

Since his arrival on the scene, coffee-growing has been gradually improving, and without question he has placed the industry on a very firm basis, and, as a consequence of his practical teachings, the area under coffee is yearly increasing.

COFFEE NOTES.

Less than five years ago the first coffee seeds were introduced into Uganda by missionaries. Now there are extensive crops under cultivation. Last year 100 tons were exported from Uganda, and this year this amount will be greatly exceeded. The quality of Blantyre coffee is said to be the best in the world, superior even to the famous Mocha.—*Commercial Intelligence*.

PEPPER CULTIVATION.

As population increases in the intertropical parts of Queensland, it is quite within the bounds of probability that men will be found desirous of engaging in other form of agriculture and horticulture than sugar, coffee, and rice. Cardamoms, vanilla, cacao, ginger, pepper, nutmegs, and many other articles of commerce will in time be found amongst our exports. The cultivation of pepper, to judge by the subjoined article, which we take from the *Tropical Agriculturist*, would seem to be an industry very suitable for our Northern lands, climate, and rainfall:—

PEPPER CULTIVATION IN MALABAR.

Pepper (*Piper nigrum*) is grown in Java, Sumatra, Ceylon, and other Asiatic countries, but that which comes from the Malabar Coast is acknowledged to be the best. The only taluqs in Malabar in which pepper cultivation is largely carried on are Kottayam and Kurumbranad. The conditions most favourable to pepper cultivation are said to be copious rains, abundant dew in the night, and a gravelly red soil. These are found in other parts of Malabar, so it is not understood why the cultivation is chiefly confined to these two taluqs. Two varieties of pepper are produced in Malabar—the black and the white. The fruit is gathered green when intended for black pepper, but must become quite ripe for white pepper. White pepper differs from the black only in being stripped of its covering. After stripping them, the black berries are steeped in salt water, and when they have been exposed to the sun for several days the chaff is rubbed off with the hands. The process of cultivation is very simple. The vine is generally propagated by cuttings. It is usually planted at the base of trees, the most commonly used being Murriku (*Erythrina indica*); other trees, such as the jack, cashewnut, and mango-tree, may also be used, but they are not in favour with the Malabar cultivators.

The first thing required for forming a pepper garden is to clear all jungle and root out all stumps of trees on the ground. This must be done by the middle of May. The Murikku standards, on which the vine is trained, should then be planted, and about half-a-dozen cuttings of the vine—each about $2\frac{1}{2}$ feet in length—should be planted at the foot of each stem. The soil should then be turned up by digging, and the cuttings tied with a fibre on to the Murikku crop. The tying is necessary to facilitate the growth of the vine, which sends out small roots at every joint, which strike into the Murikku stem and enable the vine to climb up the prop. In three or four years the vine attains a height of 6 feet.

The vines begin to bear in the third or fourth year, and in four years more are in full perfection, and continue so for twenty years, when they die. They blossom about the month of June, and begin to bear fruit in the following two months. The gathering season is January to March. The plant requires constant rains during the blossoming season. The expenses of cultivation incidental to farming and maintaining pepper plantations are variously stated. But it may be stated approximately that a plantation of 1 acre will not cost more than Rs. 300 (about £23), together with an annual expenditure of Rs. 10 (about 16s. 8d.) for its upkeep. The outturns of the pepper harvest are also variously stated. The yield ranges from one to three bharams per acre (one bharam being equivalent to 660 lb.). It is stated that a single vine produces from one edangali to four edangalis of dried pepper. There is no doubt that pepper cultivation is highly remunerative, and it is a pity that it is not carried on more extensively than it is at present.

[It would be useful to know the equivalent for the weight or measure *edangali*.—Ed. *Q.A.J.*]

A SUGAR-CANE FIELD.

By A. J. BOYD.

The last crop on the sugar estate of Mr. G. R. Mayer, on the Mulgrave, near Cairns, yielded over 40 tons of cane per acre. In the early days of sugar-growing in Queensland, when the rich scrub lands were in their virgin state of fertility, such a crop would have been looked upon as nothing remarkable, for land planted with the old Bourbon cane usually gave a return of from 60 to 80 tons of cane per acre, and even up to 100 tons when allowed to stand over for a season.

It may well be imagined that a field of 100 acres must require a large amount of labour to bring the crop to perfection, to cut, load, and truck the cane to the mill, especially as it must be got off in a hurry. Cane is not a crop which may be cut, leisurely and left on the field or stacked like hay. From the moment it is cut fermentation begins, and unless the cane is crushed at once, loss ensues both to the growers and to the mill-owners.

It is during the hottest months of the year that the most trying labour in connection with cane cultivation has to be performed, and that labour is what is technically known as "trashing." None but those who have actually done this work under a tropical sun can realise in the faintest degree the exhausting nature of the work. I have done it myself in the company both of white labourers and kanakas, and, from hard, practical experience, I am able to assert that there is no work performed by any labourer in the State of Queensland so exhausting, so demoralising, and so shunned by the white man as this abominable work of trashing.

It has been stated that trashing is unnecessary, and the controversy on that point is as old as sugar-growing, but all I can say is that the planter who does not trash runs three risks at least. One is that during continued wet weather the rain lodges at the joints of the cane just at the buds, and is held there by the trash. The next thing is, the buds swell and quickly grow into

suckers all up the cane, thus reducing the density of the juice and giving more labour to dress the cane for the mill. I have had a whole field of cane in this state, owing to want of hands to trash and the refusal of the regular hands, ploughmen, horse-drivers, &c., to save the crops by doing the work.

The second risk is that the trash harbours numbers of insects, such as borers, which injure the cane; and the third is that, at a time when the cane requires all the sun and air it can get to ripen it and raise the sugar content of the juice, it is smothered in a mass of dead leaves which effectually keep off light, sun, and air. Again, when cane-cutting is going on, the heaps of trash collected at the foot of the cane stools give the cutters harder work to do. Now, picture to yourselves a 50 or 100 acre field of well-grown cane. It stands from 8 to 10 feet high in serried rows some 6 feet apart, with half that distance between the stools of cane which number from six to twelve canes per stool. Much of the cane has been blown down, and lies in a tangled mass underfoot. Every single cane is clothed with a casing of dead leaves from the ground to the green crown. This is the so-called "trash" which has to be removed to enable the sun and air to act directly on the cane.

Enter this field, and a few yards from its outside edge you will find it difficult to force your way further into it. Overhead is the pitiless blazing sun of the tropics. Should there be any breeze at all, not a breath of it can find its way further than a few yards into the thickly-growing cane. The thermometer stands at from 120 degrees to 150 degrees Fahr. in the sun, and added to this there is a deadly muggy dampness everywhere, which renders the heat still more oppressive.

The mere physical exertion required to get through the field, without attempting any work, is a laborious and exhausting business, and the curious visitor will emerge from his voyage across it covered with dust, streaming with perspiration, and experiencing the delights of the abomination known as cane itch. What, then, must it be to work through the livelong scorching or steaming day under such conditions? I have done it over and over again, not for love of it, be sure; and I can only say that if I had to take my choice between working in the lower hold of a steamer unloading coffee, guano, or hides, doing pick-and-shovel work in the open streets of Townsville or Cooktown in the month of February, and trashing sugar-cane, I would infinitely prefer any of the former methods of earning a living.

I believe that if the Boer prisoners at St. Helena were sent to Demerara to trash cane, or those at our own St. Helena, in Moreton Bay, were to be set to such work on Northern plantations, there would be an immediate outcry against the inhuman barbarity of the authorities.

The trash is easily detached from the cane stalk—a child can pull a dead leaf off with his finger and thumb. All that the labourer has to do is to throw himself upon the stool of cane, plunge both arms into the accumulated trash, drag it clear of the cane, and deposit it in the clear space between the rows. The canes are thus left quite bare from root to crown. Easy enough, you say. The trash is neither heavy nor prickly. No, but as the work is usually done in dry weather, clouds of fine dust rise from the crackling leaves. The labourer is smothered in this dust, which gets into his eyes, into his nostrils—it covers his whole body with streaming dirt, and chokes up his bronchial tubes as badly as if he were working a cotton-gin in a close room. In addition to this annoyance, there is a still greater one arising from the hairs fringing each joint of the cane-stalk. These become detached in the process of trashing, and stick into the skin like the fine hairs on certain caterpillars or the fine hairs on the fruit of the prickly pear. These cause intense irritation; the skin burns and itches, and there is no possible escape from it or relief till knock-off time. Then, as I have said, the blazing sun overhead beats pitilessly on the unprotected worker, the dust chokes every pore, and by the time he has worked for an hour or so, if he be a white man, small wonder that he fights shy of trashing cane.

I have worked amongst my kanakas at it, and they went along merrily, shouting and raising a tremendous hullabaloo when one of them came across a black or whip snake in the thick trash. No white man can keep up with them at this work, which they prefer to chipping young cane in the open field, whilst the white man would ten times sooner work at splitting and grubbing and ploughing in the open, than work in the centre of a sweltering canefield.

WHITE AND BLACK LABOUR.

Let me show how true this is. On my plantation I employed about ten white men in the field and half-a-dozen in the mill, which was one of the simple affairs of small capacity in use many years ago when sugar brought £35 per ton, and the Bourbon and Green Ribbon cane were grown almost exclusively. As long as the growth of the young cane allowed the land to be worked by horses and implements the white men were satisfied, but in the nature of things, cane, like the briar rose on Lord Lovel's grave, grew until it was no longer possible to employ horse implements. Then trouble began. The men had to work with hoes to keep the cane clean. They objected, and one after another they gave up and left, until at last I had only three first-class Germans on the place. It became absolutely necessary to get kanakas, so I hired a dozen time-expired boys at 8s. a week and their rations. At the same time, as the crushing season drew near, I took on any sort of likely white man who applied for work. These got from 20s. to 25s. a week with quarters, but no rations. These I supplied them with at cost price.

I particularly remember two men I had thus casually picked up. The first was a fine, big, strong, young fellow, who seemed only too anxious to get settled work, and he cheerfully went down to the overseer to whom I gave him a note instructing him to put the man on to trashing. In the course of the afternoon I went down to see how the work was getting on, and I saw my new hand sitting down in his row taking a smoke, whilst the kanakas and Germans were fully twenty yards ahead of him working hard in their respective rows. Now, smoking in the middle of a full-grown cane patch, where masses of dry trash are lying about, is a thing that no planter in his senses would permit, so I roundly rated the fellow, telling him there was a set time for "smoke oh!" and no man was allowed to smoke except on the clear roadway. Then I asked him why he was so far behind the rest.

"Why am I so far behind the rest, eh boss?" was the reply. "You don't expect me to work like them—Dutchmen and kanakas, do you?"

"Well, you get the same wages as the other white men; why shouldn't you do the same work?" I asked.

"Don't you believe it, boss," he said. "I'm down from the bush myself, and I came down to the plantations for a spell, not to be nigger-drove, same as if I was a Chow."

Needless to say that this valuable reliable white labourer was relieved of his work.

The other fellow was funnier still. He also was a traveller looking for work (?)—and a knowing one he was. He arrived just as the dinner-bell rang, and was engaged by the overseer, who sent him to the white men's quarters to put away his swag and get his dinner. He worked well that afternoon, but next day at about 11 o'clock, as I was standing on the veranda of my house, I saw him emerge from the cane and go to the men's quarters. When I got there, I found him preparing to boil his quart-pot for tea. On my explaining that the dinner-bell had not yet been rung, he merely looked up and said,

"My master told me come up."

"Who is your master?" I asked.

"Who?" he shouted; "the Lord Jesus is my Master. He told me to knock off, and I've knocked off, and that's all about it."

"That's all very well, my man, but does the Lord pay your wages?"

"Never mind," said the fellow; "that's my business."

"Will you go down to your work again?" I asked, feeling rather savage by this time.

"No, not for you; not till my Master tells me to go."

"Very good," I said, "Go and get your swag and clear out of this."

He got up and rolled up his blanket, and then said:

"I say, boss! I don't go out of this without my wages. You owe me a week for sacking me without notice, and if you don't shell out I'll have the law of you."

The fellow had not earned five shillings. However, I gave him that amount, and then had him run off the place.

But there is another side to the labour question, and that tells against the time-expired kanakas. About a couple of months after the white man episodes, I decided to start the mill, so, having got everything in readiness, I told the overseer to warn the boys that they would go to cane-cutting next morning.

Just before tea-time, their spokesman, Charlie, a missionary boy and a regular sea-lawyer, came up to the house to see me.

"Well, Charlie, what you want, eh?"

"Master goin' to crush to-morrow?" he asked.

"Yes."

"Well, I think all⁷um boy want more wages," said Master Charlie, with a grin.

Then he went on to say that I could get no white men or kanakas. As the mills were about to start and all available men had been engaged, if I did not fall in with his view, my cane would not be cut that season.

It may be imagined that I was not in the best of tempers. Who would have thought of the kanakas striking?

However, after tea I went down to the boys' quarters. There appeared to be a difference of opinion amongst them. Some wanted to stay, others to go. I soon brought the matter to a head.

"How much more you give?" asked Charlie. "You give 12s.?"

"No," I cried. "Not 1s.; not 6d.; not 1d."

"All right, master, then I think all um boy go. Plenty other master."

On this I made all those who wanted to leave roll up their swags and go outside. Those who wanted to stay were to remain in the hut. I then found that only five sided with Mr. Charlie, the other six were content to stay.

"You go walk-about now, eh Charlie?" I asked.

"Yes; s'pose you no give more wages."

"No; no more wages, Charlie."

"All right; good-bye, master, me come up to-morrow get boys' wages."

"All right. Good-bye, boys," I said. And off they went, but I had not dismissed them. So in making out their separate cheques for what was due to them, I deducted one week's wages for leaving without notice.

Next morning Charlie came up, and I handed him the cheques. He looked at them all, and then said:

"This no right, master. One more week."

"It's all right, Charlie. S'pose white man talk along o' me, and say he go. I say no. He say yes, and then he go, he lose one week wages. You all same white man. You get wages. I no send you away, you tell me you go."

"You no pay im all, master?" asked Charlie, quietly.

"No, Charlie; no more."

"Then you take um all," he cried, and, flinging the cheque in my face, he went off.

He afterwards laid a complaint with the immigration agent, but was ruled out of court.

“FOXINESS” IN COFFEE.

BY MR. HOWARD NEWPORT,
Instructor in Coffee Culture.

The matter of “foxiness” in coffee is receiving some attention in some of the coffee growing centres at present, where various opinions are being expressed, and theories propounded regarding its cause, as well as suggestions for its prevention.

This is an important matter that has received too little attention here hitherto. I have found it necessary to emphasise this point in curing, in demonstration in the field on several occasions, and have also touched upon it in various articles, but a few connected notes may be of advantage for reference.

“Foxiness” is a term applied to coffee in its cured state, when it appears of a uniformly dull or blotchy reddish-brown colour, instead of a blue-grey or semi-transparent and clear slate. This foxy colour indicates a very material change in the flavour, and consequently considerably reduces its value.

Several ideas about the cause of foxiness in coffee would seem to be current, such as that it is caused by the adhesion of the silver skin, that the red colouring matter of the skin has sunk into the seed, that foxiness is caused purely by picking when over-ripe on the trees, &c., which on investigation prove only to be half-truths, or quite without foundation.

A careful study of the matter will reveal the fact that the reddy-brown colour of foxiness is always due to fermentation in some form or other, and is generally occasioned during some portion of the curing process. The adhesion of the silver skin may be caused by undue fermentation, and so may be one of the effects of foxiness, but it does not cause it; nor is the fact of the silver skin adhering to the bean necessarily evidence of foxiness.

The red colouring matter of the skin is exceedingly difficult to extract at any time, and will not readily sink or soak into anything, while the colour of foxiness can be readily obtained *after* the skin or pulp has been removed entirely. Picking when over-ripe, though often the cause, is not by any means the only, or even general, way that foxiness is occasioned.

A foxy sample of coffee may be due to any of the following causes:—1. Picking when over-ripe and fermentation has set in under the skin, when if intense, as in most hot, moist conditions, the inner bean is affected.* 2. By drying in the cherry.† 3. By delay in pulping after picking, when fermentation again takes place, encouraged by the heaping of the cherry.‡ 4. By fermenting in water, or by insufficient drainage of the fermenting vat, whereby the fermenting water soaks into the bean, mostly at the fold.§ 5. By over-fermenting.|| 6. By under-fermenting, whereby the process of fermentation continues after washing, owing to the presence of small particles of saccharine matter.|| 7. By irregular fermenting, usually due to thin metal or wood fermenting vats; insufficient covering or protection from varying temperatures,

* *Vide* Article No. 6—“Picking,” *Queensland Agricultural Journal*, March, 1901: “When to Pick,” p. 219.

† *Vide* Article No. 6—“Picking,” *Queensland Agricultural Journal*, March, 1901: pp. 219 and 220. Also, “Remarks on Coffee Notes,” *Queensland Agricultural Journal*, April, 1900: p. 300.

‡ *Vide* Article No. 4—“Pulping and Curing,” *Queensland Agricultural Journal*, July, 1900: p. 46.

§ *Vide* Article No. 4—“Pulping and Curing,” *Queensland Agricultural Journal*, July, 1900: “The Fermenting Process,” p. 47.

|| *Vide* Article No. 4—“Pulping and Curing,” *Queensland Agricultural Journal*, July, 1900: “Drying,” p. 49.

&c., whereby the centre of the heap is over-fermented while the outer parts are insufficiently done. Irregular fermenting may also be due to bad pulping and the presence of a quantity of unpulped cherry, or pieces of pulp, in the fermenting vat, around which the process is quicker than elsewhere.* 8. By bad drying, especially of over or under fermented coffee, the retention of dirty water on washed parchment (in wet weather when drying is difficult), or by dirty trays or receptacles for the newly-washed parchment, whereby a re-fermentation is induced.

* While foxiness is thus easily, and in many ways, induced, it is comparatively easy, with a little care, to avoid it. When a batch, by some chance or other, has become foxy, however, it should be kept separate and not mixed with the "A" or first quality of parchment or clean coffee. Even a small percentage of either cut, foxy, discoloured, or broken beans will make an appreciable difference in the value of the sample. Because of some such accident the grower need not conclude that his coffee is hopelessly spoilt or valueless. It is true that once foxy, it cannot be remedied, but the process of fermentation that is inducing the foxiness may be, and should be, arrested as soon as noticed. There are degrees of foxiness. The fermentation may have commenced, or proceeded through or under the parchment skin, from any of the above causes, and yet have only discoloured the silver skin, or caused it to adhere to the bean, though not have affected it, or only very slightly done so. A foxy silver skin may adhere to the bean and require careful and extra "polishing" to remove, and yet the sample not have necessarily deteriorated.†

To prevent foxiness, therefore, attention must be given to picking, fermenting or curing, and drying, and not to one process only; for all the advantage of careful work in one direction may be lost by inattention or carelessness in another.

The colour of coffee is a matter apart, and is, as I have already stated, rather a thing to retain than obtain. The yellow-brown colour of coffee, too quickly dried by artificial means or "sweated," must not be confused with foxiness. This colouring is due to quite different mechanical effects, and, though very similar at first, sweated coffee, sooner or later, turns white or patchy in colour.

Foxiness is one of the chief points that determine high and low grade coffees, and, as it is very necessary to produce a high-grade article, is a matter especially worthy of attention and care.‡

That foxiness does affect the flavour will be obvious to any grower who will take an undoubtedly foxy sample and taste the liquor produced from it side by side with that of a good-coloured sample. The smell and taste so well known to growers in their pulping-houses will be apparent, though of course in a lesser degree.

The delicate differences will not be readily noticed, however, by the grower, where the trained and expert coffee-taster will not only detect the slightest taint, but value the sample of coffee accordingly to a fraction.

Coffee-drinkers may be met with who profess a preference for the flavour of foxy coffee, and maintain that such coffee is in no way inferior in quality. Such, however, are in the minority, and that foxiness in coffee is an evil to be avoided, if possible, by growers is sufficiently shown by the fact of such coffees obtaining lower prices in the open markets.

* *Vide* Article No. 4—"Pulping and Curing," *Queensland Agricultural Journal*, July, 1900 : p. 48.

† *Vide* Article No. 4—"Pulping and Curing," *Queensland Agricultural Journal*, July, 1900 : "Drying," p. 49.

‡ *Vide* Annual Report—Instructor in Coffee Culture, 1898-99 : "The Marke for Coffee," p. 49.

Entomology.

PINEAPPLE MEALY BUG (*Dactylopius bromeliæ*, Bouché).

By HENRY TRYON,
Entomologist.

[The able entomologist of the Cape of Good Hope (Mr. Charles P. Lounsbury) has reported the occurrence, in the eastern district of that colony, of a Mealy Bug (*Dactylopius*)—a rather recent introduction—in connection with the pineapple cultivations; that growers are becoming much alarmed in consequence; and that, in one section, infected pineries are being removed. This insect he regards as being probably *Dactylopius bromeliæ*, Bouché. Being anxious to avail himself, if possible, of the facts regarding the Pineapple Mealy Bug of Queensland and its relation to the plant whence it derives its specific title, he has requested to be informed whether the latter is unquestionably Bouché's species, as formerly determined by the writer, and of the extent of its depredations, as well as concerning the degree to which it is held in check by its natural enemies. He has accordingly been furnished with the appended communication that may possibly merit being recorded.—H.T.]

Although *Dactylopius* occurs somewhat generally in the pineapple plantations of Southern Queensland, its presence therein is seldom a matter of complaint on the part of their proprietors. The writer is aware, however, that during the prevalence of dry weather it does a certain amount of damage, for at this time individuals descend to the portion of the main stem below the ground attack the more readily vulnerable parts of the plant, and even occasion its death.

In the Northern coastal districts, *Dactylopius* is more pernicious by reason of the attention bestowed upon it by ants. The Mealy Bug, as a rule, congregates at the base of the fruit, and between it and the encircling bracts, preferring to work in semi-darkness. And in the part of Queensland to which reference is made, certain species of Formicidæ increase the surface otherwise available for operating in, by building a loose wall of particles of vegetable *débris* from the base of the fruit some way upwards to its apex. Beneath this, the Mealy Bugs feed secure, bestowing their sugary excretions upon the ants, that in turn protect them from the attacks of their enemies. Thus it happens that the fruit may become much stunted in growth. This consortism with ants on the part of pineapple mealy bugs is a very marked occurrence in some parts of British New Guinea. Thus the writer has observed that on the Island of Samarai the fruit, whilst still but slightly developed, is completely covered over by ants with a canopy composed of the above-mentioned substance, and, as a result of *Dactylopius* attack, becomes brown and ultimately dry after having attained but quite small dimensions.

He is inclined to the opinion that a single species of *Dactylopius* attacks the pineapple in Queensland and New Guinea, but, although he has delayed replying to your communication whilst awaiting material wherewith to verify this conjecture, he is still unable to definitely pronounce judgment on this point, owing to its not yet having come to hand.

The pineapple *Dactylopius* of Southern Queensland, with which he is very familiar, he takes to be the *Coccus bromeliæ* of Bouché, described in 1834 in the "Naturgeschichte der Insecten," p. 20. The ascription, however, of any mealy bug to *D. bromeliæ*, Bouché, may be questioned; since there is no type in existence, and Bouché's description is not sufficiently comprehensive to adequately describe the insect that was before him. He mentions, however, one special feature on which the writer is inclined to lay considerable stress—viz., that the insect is viviparous. He also adds that it was met with on Bromeliaceæ. V. Signoret, in 1874, described, in the "Annales de la Société Entomologique de France" (5s-er. V. p. 310), a pineapple *Dactylopius* under the name of *D. bromeliæ*, Bouché, but he mentions the fact of "doutant de l'identité de nos

individus avec ceux de Bouché." Subsequent writers, including W. M. Maskell, have, however, accepted Signoret's determination without any reference to this doubt that he entertained.

As far as can be judged from Signoret's rather meagre description of the Zanzibar Pineapple Mealy Bug, that he regarded as probably *Dactylopius bromeliæ*, Bouché, there is one particular in which the Queensland insect differs from it. The terminal joint of the antenna is shorter than the 4th, 5th, and 6th joints united, and not equal to their combined length. Possibly, however, Signoret did not base his statement on actual measurement, and hence the discrepancy. The same remark applies to Maskell's Indian mulberry-frequenting *Dactylopius* that the latter identifies with the insect described by Signoret. Maskell in his description of it (Trans. N.Z. Inst., 1893, Vol. XXVI., p. 88), however, seems to have confined himself to a repetition of the account given by the French entomologist.

Signoret states that the Pineapple Mealy Bug before him resembles *D. adonidum*; and A. Berlese has shown ("Rivista di Patologia Vegetale," Vol. II.) that the insect regarded as the latter species by Signoret is the *Dactylopius longispinus*, Targioni-Tozzetti, of the two distinct *Dactylopii* included by Linnæus under the designation *D. adonidum*.

Now, the Queensland insect on its part not only conforms—save in the particular mentioned—to the descriptions given by Bouché and Signoret of the Pineapple Mealy Bugs that were under their observations, but it also resembles, too, *Dactylopius longispinus*.

It differs, however, from the latter insect in these respects. It is, when adult, a much smaller insect, seldom exceeding in length 2 mm.; the 8th antennal joint is terminally rounded, and not gradually narrowed towards an apiculate extremity; the glands occurring upon the pre-anal lobe are not contiguous, but widely separate; the legs, again, are much more robust, the width of the tibiæ being one-fourth of their length, or even more, instead of about one-sixth only; and, moreover, the insect is viviparous. Hence it is concluded that the Queensland Pineapple Mealy Bug is a special species of *Dactylopius*, and most probably *D. bromeliæ*, Bouché.

It does not seem to be much attacked by natural enemies. *Cryptolæmus montrouzieri* is, however, somewhat partial to it, and again there are grounds for concluding that it is victimised by the caterpillar of a small moth. Inasmuch, however, as it increases but slowly in this part of the State, it is probable that the further investigation would serve to show that greater results are to be attributed to the operations of its predatory foes than is to be inferred from the direct evidence available. In preventing its appearance, growers are advised to submerge suckers prior to planting in ordinary lime and sulphur wash, the use of hydrocyanic gas, which would, of course, constitute a more efficacious measure for the purpose in view, not being always convenient.

FORESTRY IN THE UNITED STATES.

The Adirondacks State Reservation covers 1,384,128 acres, says the last report of the State Fish and Game Commission; and the commission believes that if scientific forestry were applied to this reserve about 200,000 dollars per year could be derived from the sale of timber. A study of the timber production has been made by the Superintendent of Forests, Colonel W. F. Fox, and he gives the figures for the production in 1899. Estimating that there are 1,000,000 acres of forest land, and figuring on the basis of production, he reports that, under proper management, mature timber, that now goes to waste, could be annually sold to the above amount. Cornell University is now studying this problem in its School of Forestry; and the United States Forestry Department is also preparing working plans to be applied to various townships, provided means are appropriated.—*Engineering News*.

Science.

NUTRITIVE ELEMENTS OF VARIOUS FOODS.

Science has demonstrated that the principal food elements required by the human organism are nitrogenous, for the building of muscles and tissues; carbonaceous, for the production of heat and energy; and mineral, for bone and nerve building. Albumen, gluten, and caseine are examples of nitrogenous elements; starch, sugar, and fats, of carbonaceous; and salts, cellulose, and inorganic substances, of mineral elements.

The following table shows the proportion of nutritive elements of the three classes above named, contained in 100 parts of some of the more common substances used as food:—

Foods.	Nitrogenous.	Carbonaceous.	Mineral.	Total Nutritive Value.	Foods.	Nitrogenous.	Carbonaceous.	Mineral.	Total Nutritive Value.
GRAINS.					LEGUMES.				
Wheat	10·8	72·5	1·7	85·0	Peas	23·8	60·8	2·1	86·7
Barley	6·3	76·7	2·0	85·0	Beans	30·8	50·2	3·5	84·5
Oats	12·6	69·4	3·0	85·0	Lentils	25·2	58·6	2·3	86·1
Rye	8·0	75·2	1·8	85·0					
Maize	11·1	73·2	1·7	86·0	NUTS.				
Rice	6·3	80·2	0·5	87·0	Peanut	28·3	48·0	3·3	79·6
FRUITS.					Almond	23·5	60·8	3·0	87·3
Banana	4·8	20·2	0·8	25·8	Cocoanut	5·6	43·9	1·0	50·5
Date	9·0	58·0	...	67·0	Walnut	15·8	60·4	2·0	88·2
Grape	0·8	14·3	0·3	15·4	Hazelnut... ..	17·4	60·8	2·5	89·7
Apple	0·2	10·3	0·4	10·9					
Pear	0·2	10·2	0·3	10·7	SWEETS.				
Peach	0·4	7·8	0·4	8·6	Sugar	...	95·0	...	95·0
Plum	0·2	9·3	0·6	10·1	Treacle	...	77·0	...	77·0
Cherry	0·9	15·3	0·6	16·8					
Blackberry	0·5	5·8	0·4	6·7	MILK.				
Gooseberry	0·4	8·9	0·3	9·6	New Milk	4·1	9·1	0·8	14·0
Raspberry	0·5	6·4	0·5	7·4	Cream	2·7	29·5	1·8	34·0
Currant	0·4	5·0	0·5	5·9	Skimmed Milk	4·0	7·2	0·8	12·0
Apricot	0·5	12·2	0·8	13·5					
VEGETABLES.					MEATS.				
Arrowroot	...	82·0	...	82·0	Lean Mutton	18·3	4·9	4·8	28·0
Potato	2·1	22·2	0·7	25·0	Lean Beef	19·3	3·6	5·1	28·0
Sweet Potato	1·5	27·5	2·6	31·6	Veal	16·5	15·8	4·7	37·0
Carrot	1·3	14·7	1·0	17·0	Pork	9·8	48·9	2·3	61·0
Beet	1·5	11·3	3·7	16·5	Poultry	21·0	3·8	1·2	26·0
Parsnip	1·1	15·9	1·0	18·0	White Fish	18·1	2·9	1·0	22·0
Cabbage	0·9	4·1	0·6	5·6	Salmon	16·1	5·5	1·4	23·0
Turnip	1·2	7·2	1·6	9·0	Egg	14·0	10·5	1·5	26·0

NOTE.—From the above it will be seen that grains, legumes, nuts, and sweets, as well as some fruits and vegetables, contain more nourishment than do meats.

*Many and extended experiments and observations under the most favourable conditions have proved that the proper proportion of food elements for the needs of the system is about 1 part of nitrogenous to 7 parts of

carbonaceous. The following exhibit shows the proportion of carbonaceous elements to one of nitrogenous in a few of the more common articles of food :—

				Nitro- genous.	Carbon- aceous.					Nitro- genous.	Carbon- aceous.
Lean Beef	...	...	...	1	5	Wheatmeal or Bread	...	...	...	1	7.0
Eggs	...	...	...	1	1.9	Maizemeal	...	...	...	1	7.7
Peas	...	...	...	1	2.7	Rye Bread	...	...	...	1	9.8
Beans	...	...	...	1	2.7	Potatoes	...	...	...	1	10.7
Lentils	...	...	...	1	2.4	Carrots	...	...	...	1	11.5
Milk	...	...	...	1	3.6	Barley-meal	...	...	...	1	12.7
Fat Beef	...	...	...	1	5.0	Rice	...	...	...	1	13.0
Oatmeal	...	...	...	1	6.1						

By the above table it will be seen that wheatmeal is the food which, of all single substances, most perfectly meets the requirements of the system, containing exactly 7 parts of the carbonaceous elements to 1 of nitrogenous.

Regarding the quantity of food that is needful to properly sustain life, there must necessarily be considerable variation. Such conditions as age, weight, and occupation of the individual, must be taken into consideration in deciding this matter. Climatic conditions also have a bearing upon the question. After much careful study and experimentation, scientists are quite generally agreed that a healthy adult of average weight, doing a moderate amount of work, requires from 20 to 30 oz. of solid food per day, one-eighth of which should be nitrogenous and seven-eighths carbonaceous. But as all food substances contain more or less material that serves scarcely any purpose except that of bulk, this must also be taken into consideration in the selection of a dietary. A certain amount of bulk is very necessary in our food to serve the purpose of distending the walls of the stomach and intestines. A proper dietary should also contain a reasonable proportion of the necessary mineral elements—salts, phosphates, &c.

By studying the tables that appear on this page one can readily discover the proper quantities and proportions of the foods named that are needful to form a suitable dietary. Doubtless most people can also obtain access to similar authority as pertaining to many other articles of food. These demonstrations of science must be given careful study if one would select the most approved dietary. Haphazard selection of such articles as agree with the palate, regardless of the real needs of the system, will most assuredly result in serious consequences ere long.—*Exchange*.

FOOD VALUE OF THE SWEET POTATO.

The analysis of the sweet potato is given thus in *Dalgety's Review* :—The sweet potato contains more dry matter and more starchy and sugary food, but less nitrogenous material than the ordinary potato; 100 lb. of sweet potatoes contain 69.32 to 73.11 lb. water, 1.09 to 1.29 lb. ash, 1.38 to 2.47 lb. protein (*i.e.*, flesh-forming material), 0.86 to 1.23 lb. fibre, 29.73 to 28.46 lb. nitrogen-free extract (starch, sugar, gums, &c.), and 0.43 to 0.85 lb. fat; a total of 27.46 to 32.49 lb. dry matter. As a comparison it may be said that 100 lb. maize contain 89.1 dry matter, 10.5 protein, and 75 lb. nitrogen-free extract, while 300 lb. sweet potatoes contain 86.7 dry matter, 4.5 lb. protein, and 75.3 lb. nitrogen-free extract. In Japan sweet potatoes are dried. The mode is :—“Cleanly washed potatoes are placed in a suitable basket and immersed in boiling water for a short time; when taken out of the basket they are cut into thin slices and spread over mats and exposed to the sun for three or four days. In order to make a superior quality the skin of the potato is peeled off before slicing.” The best conditions for keeping sweet potatoes are by maintaining a temperature of about 75 degrees Fahr. for a week or two after digging, then lowering the temperature and keeping them through the winter in a dry storage room at from 50 to 60 degrees Fahr. Condensation of moisture on the roots tends to decay.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.												1901.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
<i>North.</i>													
Bowen ...	7.61	0.40	0.88	0.59	0.89	1.14	0.96	0.76	0.12	0.31	0.05	2.30	17.25
Cairns ...	43.06	1.98	8.90	3.77	3.56	1.66	0.20	Nil.	2.44	1.52	1.61	4.19	11.53
Geraldton ...	62.23	2.36	8.86	8.86	8.33	2.34	1.02	Nil.	2.63	3.17	2.39	18.68	23.32
Herberton ...	11.90	0.23	1.97	2.19	0.57	0.12	0.98	Nil.	0.74	Nil.	3.11	4.01	8.25
Hughenden ...	6.43	1.04	0.01	Nil.	0.11	0.02	2.45	Nil.	0.14	Nil.	0.10	0.61	1.62
Kamerunga ...	...	1.01	8.60	3.25	3.65	Nil.	0.18	0.03	1.42	1.98	1.28	2.38	15.91
Longreach ...	1.68	0.48	Nil.	Nil.	0.14	Nil.	2.34	0.50	Nil.	Nil.	0.19	0.11	0.41
Lundinda ...	37.35	1.71	4.90	4.44	9.08	1.10	1.04	0.08	0.44	1.33	0.88	2.48	31.80
Mackay ...	20.86	0.65	4.12	2.40	2.89	2.00	3.25	0.74	1.19	0.48	0.12	7.00	24.85
Rockhampton ...	4.53	0.25	1.64	0.93	1.38	0.71	1.70	0.92	2.52	0.53	1.15	0.68	0.49
Townsville ...	21.09	0.07	1.68	0.87	2.31	0.41	0.57	0.12	0.25	0.91	0.05	0.76	14.91
<i>South.</i>													
Barcaldine ...	3.08	0.65	0.09	2.03	1.38	0.29	4.38	1.63	0.03	Nil.	0.30	1.20	0.15
Beenleigh ...	5.42	3.19	3.16	1.25	7.55	2.18	4.77	1.06	1.90	0.26	2.80	1.19	5.99
Biggenden ...	...	0.40	2.81	0.28	3.06	1.43	3.23	0.98	3.07	0.87	1.65	0.06	1.11
Blackall ...	1.73	1.31	0.63	0.63	2.19	0.33	2.21	0.66	0.12	Nil.	0.29	0.17	0.29
Brisbane ...	6.51	5.18	3.37	1.38	5.45	2.68	4.36	0.79	1.52	0.14	2.48	0.55	3.43
Bundaberg ...	4.63	0.86	1.86	1.15	3.97	1.46	5.20	1.14	1.56	3.05	1.06	1.28	2.34
Caboolture ...	3.04	4.18	5.66	1.42	7.04	2.14	3.73	1.56	2.94	1.99	0.86	2.11	1.11
Charleville ...	1.01	0.08	0.79	Nil.	1.15	1.31	1.80	0.13	0.59	0.13	0.19	1.13	0.19
Dalby ...	0.41	6.31	2.80	2.46	2.54	1.29	1.70	1.72	1.67	Nil.	1.77	3.37	2.89
Emerald ...	3.08	1.22	3.97	0.42	2.72	1.15	3.96	0.52	0.35	0.18	0.31	1.08	3.65
Esk ...	1.42	2.34	4.73	1.50	4.78	1.89	2.85	1.39	3.00	Nil.	1.35	1.80	3.99
Gatton College ...	2.40	4.07	3.13	2.24	4.24	1.15	2.73	1.33	2.81	Nil.	4.12	0.47	6.27
Gayndah ...	2.52	2.07	1.11	1.22	2.57	0.88	3.36	1.42	3.23	3.21	1.84	0.08	1.22
Gindie ...	...	0.57	1.04	0.96	3.01	0.92	3.01	0.55	0.22	0.27	0.49	1.32	1.57
Gympie ...	5.59	1.84	2.76	1.05	3.63	0.82	3.34	0.84	5.67	0.18	0.84	0.47	2.57
Ipswich ...	2.79	1.66	1.85	1.47	4.73	1.45	2.25	1.17	1.37	0.01	3.93	0.47	2.09
Laidley ...	0.64	3.15	2.87	1.94	4.36	1.41	2.28	1.08	2.49	Nil.	4.55	0.63	4.01
Maryborough ...	4.88	1.78	3.26	1.17	4.33	1.21	4.32	0.57	3.55	1.22	0.68	1.18	5.03
Nambour ...	4.07	5.64	4.67	2.78	7.77	1.35	3.42	1.81	4.15	0.52	1.91	2.19	4.25
Nerang ...	4.60	3.37	3.06	0.47	18.28	2.84	7.74	1.08	2.79	0.26	3.02	2.92	4.26
Roma ...	0.43	1.52	4.40	0.23	2.07	2.14	2.14	1.05	0.77	0.66	2.20	3.28	1.13
Stanthorpe ...	2.62	4.81	1.87	1.70	3.17	1.22	2.26	1.50	3.98	0.23	2.17	2.16	...
Taroom ...	1.78	3.65	2.92	2.11	2.55	1.40	2.46	2.91	2.26	1.47	0.45	0.24	1.40
Tambo ...	2.28	1.55	0.30	0.02	2.94	1.49	1.75	0.59	0.19	Nil.	1.87	1.52	0.52
Tewantin ...	1.69	4.87	5.36	1.02	5.90	3.03	5.89	1.97	5.78	1.48	0.74	0.95	7.04
Texas ...	1.56	3.39	1.63	1.48	3.35	1.86	2.72	0.66	2.68	0.35	2.67	3.33	1.29
Toowoomba ...	1.01	2.90	2.87	2.00	4.67	1.69	2.47	1.35	1.95	0.43	2.42	2.40	3.60
Warwick ...	1.84	4.19	1.93	1.01	3.31	1.23	1.99	1.11	2.72	0.13	2.01	2.50	2.90
Westbrook ...	...	3.71	1.78	1.81	3.04	1.16	1.85	1.18	0.60	0.04	4.59	1.35	1.88

CLEMENT L. WRAGGE,
Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, choicest, 108s. to 110s.; New Zealand, 110s. to 112s.; Danish, 116s. to 118s. per case.

CHEESE.—American, 52s. to 53s.; Canadian, 54s. to 55s.; New Zealand, 52s. to 53s.

SUGAR.—Refined, £16 to £16 8s. per ton; German beet, 88 per cent., 9s. per cwt.

SYRUPS.—£10 to £11 per cwt.

MOLASSES.—6s. to 7s. per cwt.

RICE.—Rangoon, £9 to £16; Japan, £14 to £22; Java, fine to finest, £21 to £25; Patna, fine, £20 to £24 per ton.

COFFEE, in bond (duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 43s. to 70s.; finest, 80s. to 110s.; pea-berry, 48s. to 115s.; Santos, 31s. to 50s.; Mocha, 70s. to 90s.; Jamaica, finest, 95s. to 110s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{3}{4}$ d. to $4\frac{1}{2}$ d.; Natal, $5\frac{1}{2}$ d. to $7\frac{1}{2}$ d.; Bermuda, 1s. 6d. to 1s. 10d. per lb.

WHEAT.—Australian, 30s. 9d.; New Zealand, 28s. 6d. to 29s. 3d. per 496 lb.; Duluth, 33s. 6d.; Manitoba, 32s. 6d. to 33s. per 480 lb.

MALTING BARLEY.—English, 34s. to 40s. per 400 lb.; Californian, 22s. to 28s. per 448 lb.

OATS.—New Zealand, 22s. to 26s. per 384 lb.; Canadian, 16s. 6d. to 17s. per 320 lb.

SPLIT PEAS.—40s. to 60s. per 504 lb.

GINGER.—Calicut, good medium, 44s.; medium, cut rough, 34s.; small, cut rough, 29s. Japan, rough, 25s. to 28s. Jamaica, good bright, £3 10s. to £4; middling to fair, £2 10s. to £3 5s. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; chillies, 36s. to 43s. per cwt.

TOBACCO.—Prices remain as quoted last month.

WINE.—Fair red wine (Australian claret type), in bond, 2s. to 2s. 6d. per gallon; fine old quality, 4s. 6d. per gallon.

GREEN FRUIT.—Apples, 14s. to 18s. per case; pineapples, 3s. to 5s. each. Oranges: Common, 8s. to 10s. 6d. per 420; fine, 14s. to 18s.; finest selected, 24s. to 40s. Lemons: Messina, 18s. to 20s.; Palermo, selected, 10s. to 18s. per 420. Bananas, 12s. to 14s. per bunch.

COTTON.—Sea Island, ginned in Florida, 8d.; clean Upland, in London, 7d. per lb.

COTTON WASTE.—21s. to 30s. per cwt.

COTTON SEED.—£7 12s. 6d. to £9 per ton.

OIL CAKE.—Decorticated cotton cake, £6 12s. 6d. to £7.

EGGS.—Danish, 9s. to 12s. 6d.; French, 7s. 6d. to 11s. per 120.

HONEY.—45s. per 80-lb. keg.

BEESWAX.—1s. 5d. per lb.

OLIVE OIL.—£35 to £39 per tun; eating oil, 50s.

LINSEED.—54s. to 65s. per quarter.

LINSEED OIL.—£27 10s. to £28 per ton.

COTTON-SEED OIL.—21s. 6d. to 22s. 6d. per cwt.

LINSEED OIL CAKE.—£8 10s. to £8 12s. 6d. per ton.

WOOL.—At the last London wool sales, scoured merinos showed a slight advance on opening rates of the series. All other classes of wool were firm. The last series of sales closed on 28th March.

FROZEN MEAT.—New Zealand Mutton: Canterbury, $4\frac{3}{8}$ d.; Dunedin and Southland, $4\frac{1}{8}$ d.; North Island, 4d. Australian Mutton: Heavy (over 50 lb.), $3\frac{5}{16}$ d.; light (under 50 lb.), $3\frac{1}{16}$ d. River Plate Mutton: Heavy, $3\frac{1}{2}$ d.; light, $3\frac{1}{2}$ d. New Zealand Lambs: Prime Canterbury (32 lb. to 42 lb.), 6d.; fair average, $5\frac{1}{2}$ d. Australian Lambs: Prime (32 lb. to 40 lb.), 5d.; fair average, $4\frac{3}{4}$ d. New Zealand Beef (fair average quality): Ox fores (100 lb. to 200 lb.), $3\frac{1}{8}$ d.; ox hinds (180 lb. to 200 lb.), $3\frac{1}{2}$ d. Australian Frozen Beef (fair average quality): Ox fores (160 lb. to 200 lb.), 3d.; ox hinds (160 lb. to 200 lb.), $3\frac{5}{16}$ d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies, or inferior qualities.

BACON.—Irish, 54s. to 61s.; American, 41s. to 46s.; Canadian, 50s. per cwt.

HAMS.—Irish, 72s. to 100s.; American, 42s. to 50s. per cwt.

HIDES.—Business in hides has improved.

SKINS.—Active demand for best qualities.

TALLOW.—Market depressed. Fine mutton, 28s. 6d. per cwt.; good beef, 25s. 6d. per cwt.

Animal Pathology.

THE ELIMINATION OF TUBERCULOSIS FROM THE DAIRY HERD AT ST. HELENA.

By C. J. POUND, F.R.M.S., Government Bacteriologist.

It is almost impossible to over-estimate the value of properly prepared tuberculin when used judiciously by competent persons for the purpose of detecting the presence or otherwise of tuberculosis in a dairy herd. Notwithstanding, however, the marvellous results that have been achieved by the application of this valuable diagnostic agent, and the voluminous literature which has been published on the subject in almost every country throughout the world, there still are a number of stockbreeders and dairy farmers who are prepared to condemn tuberculin as a dangerous substance and also as non-efficient. This can only be accounted for by a want of knowledge on the subject, or, as is highly probable, in some cases the stockowners are prejudiced, because under no conditions whatever are they anxious to know whether or not tuberculosis exists in their herds.

The past experience of several years has demonstrated most clearly that the tuberculin prepared at the Queensland Bacteriological Institute is absolutely harmless when intelligently employed, and no better illustration can be afforded than by the systematic and periodical use of this invaluable agent in the stamping out of tuberculosis from the Government dairy herd at the Island of St. Helena, and the observations of which might be accepted as a guiding lesson to every dairy farmer throughout the State.

In previous articles I described in detail the application of the tuberculin test on the St. Helena herd, and also a number of recommendations to be specially observed in preventing the reappearance of tuberculosis.

It is particularly interesting to note that the regulations I set forth have been successfully carried out, with the result that the opinion I expressed in December number of the *Agricultural Journal* for 1898 has proved correct—namely, that all the cattle on the island could, within a very short time, be guaranteed free from tuberculosis.

After the first testing in September, 1898, it was discovered that of sixty-eight animals comprising the dairy herd at St. Helena, nine of them—viz., seven cows, one heifer, and one young bull—reacted. The two latter and three of the cows were immediately destroyed, and on *post-mortem* examination were found to be all affected with some form of tuberculosis; while the remaining four reacting cows (Annie, Bluebell, Floss, and Snowdrop), which were in calf, being of a fairly strong constitution and pure-bred imported Ayrshires, were removed to a special paddock at the Indooroopilly Experiment Station and kept under constant observation, and immediately after birth the calves were separated from their mothers. The cows were milked regularly night and morning under the strictest precautions, while the milk after being thoroughly sterilised was used exclusively for feeding the four calves, which, from all appearances, did remarkably well. When about a month old, each calf was subjected to the tuberculin test, but not one exhibited any signs of response. The calves continued to feed on the sterilised milk of the tuberculous cows until they were five months old, when they were removed to and allowed to run with the healthy herd at St. Helena.

The four tubercular cows were next mated with a Shorthorn bull that was obviously suffering from a chronic form of generalised tuberculosis. Only three of the cows became pregnant (the exception being Annie), and calved in due course. The same method of procedure was adopted with the calves as with the first lot—i.e., they were fed on the milk of the tuberculous cows after it had been sterilised. When four weeks old, each calf was tested with tuberculin, but not one responded. When Floss's calf was two months old it was

killed, and on *post-mortem* examination no signs of tuberculosis were detected. The other two calves continued to be fed on the sterilised milk until they were capable of living entirely on grass and a little bran and chaff. Both Bluebell and her second calf (Plate XXIII.) began to lose condition—in fact, the calf, although having the best of food in addition to the sterilised milk, became stunted in growth. At the age of twelve months, Snowdrop's and Bluebell's calves were again tested, the former giving no reaction, while the latter reacted to the test in a marked manner, and, in consequence, was forthwith destroyed. *Post-mortem* examination revealed the presence of tuberculosis.

We now come to the third testing of the St. Helena herd, with the result that every animal was found free from tuberculosis except one—which, strange to say, was Bluebell's first calf. Since the arrival of the latter at St. Helena, it began to grow weak and sickly-looking; in fact, the officer in charge spoke of the animal as a waster. The calf was accordingly killed, and on *post-mortem* examination the test was confirmed, for there was distinct evidence of a generalised form of miliary tuberculosis.

It is interesting to know that the four cows, during their sixteen months' sojourn at Indooroopilly, were subjected to the tuberculin test on four different occasions, but not one failed to respond.

It was the intention, considering the physical conditions of these four cows, to continue breeding from them, but, unfortunately, other circumstances intervened. At the time of the arrival in the tick-infested paddocks at the Indooroopilly Experimental Station, the four cows in question were so heavy in calf that it was deemed inadvisable to protectively inoculate them for tick fever for fear they might abort; while after they calved it appeared probable, as a result of the prolonged tick-infestation, that they might have acquired immunity, but this proved not to be the case, for they all died within a few weeks of one another from acute tick fever. Annie remained in about the same condition from the time of her arrival till she died. Floss and Snowdrop both improved considerably in a few months, and kept very fat. Bluebell, after the first twelve months at Indooroopilly, commenced to lose condition.

The opportunity was now available for proving the correctness of the tuberculin test, and consequently a *post-mortem* examination was made in each case, and all four animals were found to be affected with tuberculosis.

Post-mortem Appearances of the Four Cows.

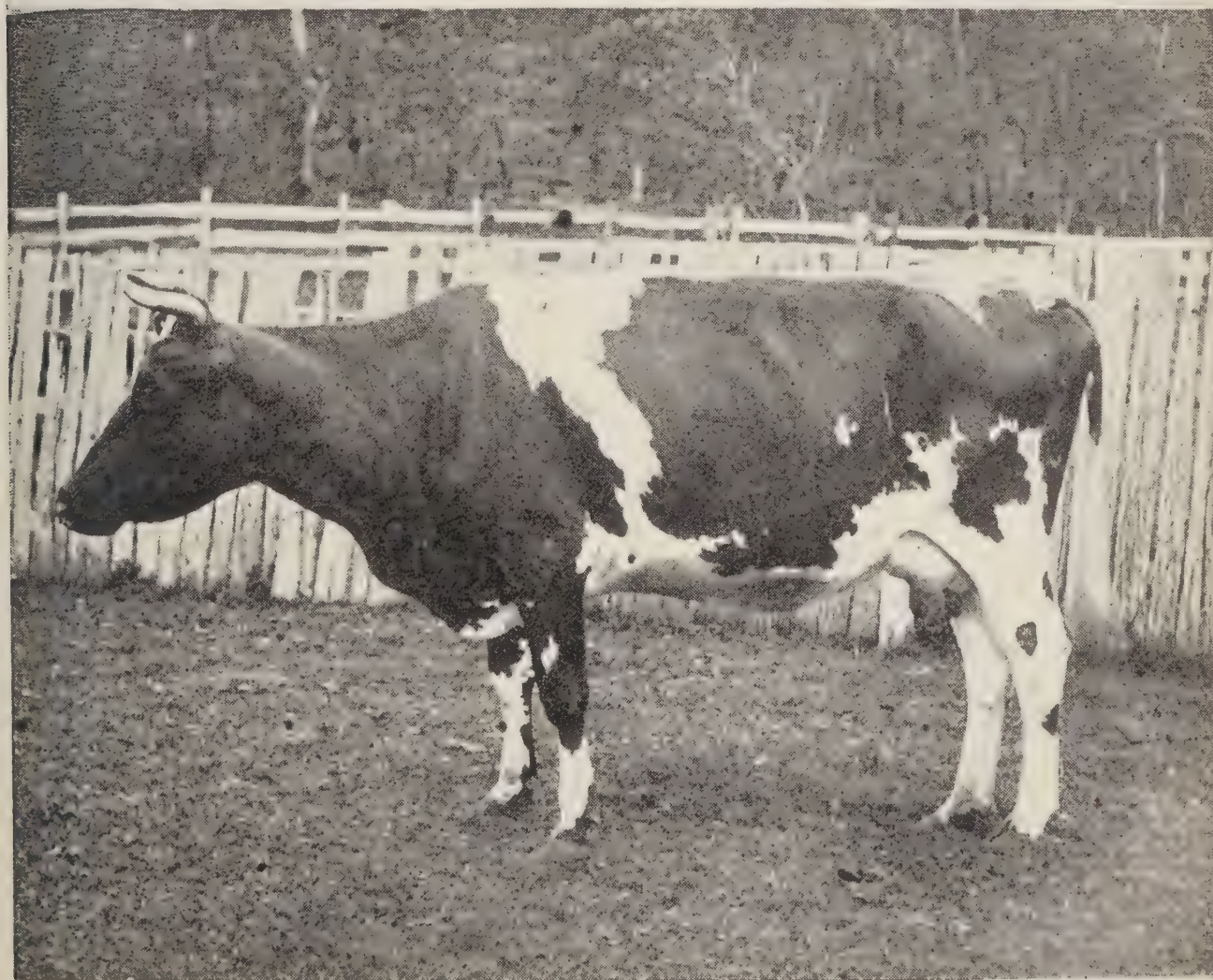
FLOSS.—The lungs were a fresh pink colour and healthy-looking throughout, but deeply seated were a few caseating tubercles. Bronchial glands enlarged with calcareous and caseous deposits. Liver contained a few calcareous tubercles. Mesenteric glands enlarged and slightly caseous. Mammary lymphatic glands on the left side were considerably enlarged. Left hindquarter of the mammary glands infiltrated with tuberculosis, but no signs of caseation.

SNOWDROP.—Bronchial and post pharyngeal glands enlarged and calcareous. Lungs slightly affected. Both mammary lymphatic glands slightly affected with tubercle. Fore right quarter of udder indurated, with indications of caseation.

ANNIE.—Apex of right lung caseous; bronchial. Post pharyngeal and super mammary glands all more or less tubercular; indurated mass in the right forequarter of mammary gland.

BLUEBELL.—Lungs and liver contained several large caseous masses. Bronchial and post pharyngeal glands enlarged and tubercular. Pleural side of diaphragm and right chest wall studded with tubercles. Mesenteric gland enlarged and caseous. Ovaries and uterus tubercular.

The *post-mortem* examination of the cow Bluebell affords a clear explanation why her two calves were proved to be affected with the disease.



1. "ANNIE"

2. "BLUEBELL"

Twelve months after first reaction



3. "FLOSS," 11 years old, twelve months after first reaction.

4. "SNOWDROP," 8 " " " "

5. "TOMMY," 3½ , showed first reaction to the Tubercular test at ten months old.

TABLE SHOWING THE RESULT OF BREEDING FROM FIVE TUBERCULOUS COWS WHOSE PROGENY HAVE REMAINED FREE FROM THE DISEASE.

Tuberculous Cows.				Age when Killed.	Age of Progeny at Present Time or when Killed.		
					Over 3 Years Old.	Over 2 Years Old.	Over 1 Year Old.
Diana	A	...	...	7 years	1	...	...
Dinah	B	...	...	9 "	1	1	...
Annie	C	...	...	11 "	1	1	1
Floss	D	...	...	11 "	...	1	1*
Snowdrop	E	...	...	8 "	1	1	1*

NOTE.—The first two cows (A and B) were killed immediately after the first testing in September, 1898.

* Both sire and dam of these calves were tuberculous.

The fourth and last testing at St. Helena was carried out in November, 1900, when the whole herd, comprising fifty-seven animals, were found to be free from tuberculosis.

TABLE OF RECORDS OF REPEATED TUBERCULIN TESTS MADE ON THE DAIRY HERD AT ST. HELENA.

—	September, 1898.		October, 1898.		September, 1899.		November, 1900.	
	Tested.	Reacted.	Tested.	Reacted.	Tested.	Reacted.	Tested.	Reacted.
Cows ...	33	7	33	7	29	...	30	...
Heifers	28	1	28	1	31	...	19	...
Bulls ...	7	1	7	1	7	1	8	...
	68	9	68	9	67	1	57	...

EXPLANATION OF THE PLATES.

1. Cow.—Annie, eleven years old, had 6 calves

2. Cow.—Bluebell, eleven years old, had 7 calves

3. Cow.—Floss, eleven years old, had 7 calves

4. Cow.—Snowdrop, eight years old, had 5 calves

5. Bull.—Tommy, three and a-half years old, showed first reaction to the tubercular test at ten months old.
- Photos taken twelve months after the first reaction was detected.

CATTLE DIP EXPERIMENT AT INDOOROOPILLY.

Mr. P. R. Gordon, Chief Inspector of Stock, has furnished the following further progress report on experiments conducted by him at the Indooroopilly Cattle Dip. Several proprietary dips were tested, the parties submitting the medicaments bearing the cost of charging the dipping vat, and the Department of Agriculture supplying the tick-infested cattle and labour for the test:—

On 27th February thirty-three cows and calves and one bull, belonging to Mr. Russell, a dairymen at Indooroopilly, were passed through a dip composed of Thomas's carbolised dipping composition, at a strength of 1 drum (5 gallons) of the paste to 1,500 gallons of water.

This dip has long been known to me by reputation as an effective sheep dip, but, as up to the present, dips that have been effective in destroying sheep ticks and the scab acari had failed to destroy the cattle tick.

Two heifers of the number dipped were retained in the paddock for observation. Four hours after dipping no dead ticks were found on the cattle. On the following day a few dead and a number of live mature ticks were found on the heifers. A few of the latter were taken off and have since deposited ova.

but up to the present (fifteen days) none of the ova have hatched. On the second day the results were similar. On the third day there were still a few live ticks, but hundreds of dead ones were found.

The heifers were under daily observation up to the 4th March, when a few ticks still showed signs of life; all the others were dead and shrivelled up. The remainder of the dipped cattle were seen daily on Mr. Russell's farm, and up to the present the cattle are contented, free from ticks, and in good condition.

The peculiarity of this dip is that, although not uniformly fatal to the mature, it was decidedly fatal to the larval and immature ticks.

Unlike many other dips, particularly those in which oil and arsenic form the principal ingredients, this dip had no bad effect on the skin; nor did it cause temporary stiffness. On the contrary, it seemed to exercise an emollient effect on the skin, imparting to it a feeling as if the dip had been largely charged with soap.

The cost of the 2,000 gallons of the liquid in the dip, according to the quotation on the drums, would be £7 10s.

On the 4th March, a grossly tick-infested heifer was dipped in a solution of Odam's improved fluid sheep dip at a strength of 1 part of the dip to 60 parts of water. The heifer was kept immersed for one minute, and has been kept under daily observation ever since. Only two or three dead ticks were found on her, and the matured ticks taken from her since dipping have deposited ova. The heifer is still grossly infested.

On the same date, twenty-three head of cattle, the property of Mr. H. Andrews, a dairyman at Indooroopilly, were put through a dip commercially known as the "North of Ireland Dip," at a strength of 1 part of the dip to 50 parts of water. One of the dipped cows was retained in the paddock for daily observation. This dip completely failed to destroy the ticks, and at the present time the cattle are as badly infested as prior to dipping.

It has often been represented to me that it is impossible to plunge the heads of the cattle under while swimming through the bath. In our experiments we have found no difficulty in this. A man stationed midway between the ingress and egress of the dip, with an iron crutch, about 12 inches long, slightly curved and attached to a handle about 6 feet long, has no difficulty, by placing the crutch immediately behind the horns, in plunging the head and the whole of the body under the surface of the bath.

A DELICIOUS WAY OF COOKING SWEET POTATOES.

To prepare the potatoes according to the Southern mode, we (*Florida Agriculturist*) are told that they should be peeled and boiled until they are thoroughly but not too well cooked. They should be cut into four pieces lengthwise, and placed in a tin baking pan. Butter and sugar should be placed over the potatoes abundantly before they are put in the oven to bake slowly. After a while, the butter and sugar mingling with the juice of the potatoes form a delicate crust that should be cooked until it has almost reached the point at which it is candy. Under this crust is a thick, rich syrup of the sap of the potatoes, sugar, and butter. Anybody who has eaten sweet potatoes in this way will never be satisfied with any other way of cooking them. The principal merit of this method lies, of course, in having them thoroughly cooked. The fire must be slow, and the cooking must continue until the sugar and butter on top of the potatoes have formed a crust.

Agricultural Patents.

PATENTS ACCEPTED.

WIRE-JOINTING STRAINERS.—Class 35—5724: Francis Temple Page, of Pahiatua, New Zealand, farmer. "An Improved Appliance for Straining Wires, Wire-netting, and the like." Dated 18th October, 1900. (Drawings, 7s. 6d.; specification, 6s.) A pair of wire-grips, each with serrated cam or dog, are attached the one to a short length of chain, and the other by a link to a lever with two draghooks of different length which can alternately grapple with the chain and pull the ends of the wires together; a special form of wire-knot is also illustrated.

CUTTING AND TOPPING SUGAR-CANE.—Class 30—5573: Francis Henry Abraham, of Neil street, Toowoomba, Queensland, watchmaker. "Improved Means for Cutting and Topping Sugar-cane." Dated 12th July, 1900. (Drawings, 15s.; specification, 7s. 6d.) The front of the machine carries a horizontally sliding guillotine knife which is pressed forward by long spiral springs; behind the knife is a reciprocating bar which normally does not reach the clips on the guillotine knife, but, as soon as the knife is pressed back a little by coming in contact with the cane, the knife is caught by the clips engaging the reciprocating part, drawn back against the springs, and liberated at the back of the stroke, so that it is propelled against the cane as a catapult. The cut cane falls on a travelling web, and is carried past vertically reciprocating knives that cut off the tops, and the cane then is carried further back and dropped.

WHIRLING VESSEL FOR CREAM SEPARATOR.—Class 32—5694: Martin Dessau, Director of Overgaden neden Vandet, No. 9, Copenhagen, Denmark. "A Liner for Centrifugal Creamer Liquid Separators." Dated 1st October, 1900. (Drawings, 7s. 6d.; specification, 5s. 6d.) Improvement on German patent, No. 48,615. The milk is introduced down an axial tube, and whirled between conical guide-plates with wide ends downwards; between the plates and the outer drum is a liner with inwardly projecting pockets, each pocket being provided with small holes at the apex and near the base to assist the last particles to collect into larger globules to facilitate their travels past the plates in a contrary direction to the outside stream of skim milk. Sufficient space is provided between the liner and the outer drum for a larger accumulation of mud than usual to reduce the frequency of cleansing.

WINDMILL.—Class 91—5716: Henry Braby, consulting engineer, and Charles Coutts, merchant, both of Ayr, Queensland. "An Improved Wind Motor." Dated 12th October, 1900. (Drawings, 12s. 6d.; specification, 4s.) This comprises parallel-flow windsails, turntable, gearing to reciprocating rods, and steering gear. The windsails have one or more pairs of flat semicircular vanes attached to the vane-axle, with the diameters of each pair at right angles; the vane-axle has bearings at each side of the sail-wheel on the top of a U-frame attached above the turntable; the crank-axle is at the base of the U-frame below the windsail, and the speed is reduced by chain gear. The windsail is nearly in the axis of the turntable, which has ball-bearings and is steered by a rudder to leeward having inclined slings, but without automatic reefing.

ROTATING WELL-DRILL PLANT.—Class 85—5417: Ferdinand Heinrich Dannhardt, of No. 20 Sherwood street, Richmond, near Melbourne, Victoria, mechanical engineer, and Melrose Mailer, of No. 685 Rathdowne street, North Carlton, near Melbourne, Victoria, medical practitioner. "An Improved Earth or Rock Drill." Dated 12th March, 1900. (Drawings, £2 5s.; specification, £1 10s. 6d.) In a "Calyx" system of boring, the operative cutter-head is made smaller than the rotating tubes, so that it may be withdrawn for

sharpening and renewal without lifting the string of tubes. The end of the head carries a cylindrical toothed cutter, and also lateral cutters which are projected by cam-bars operated from the surface by a drag-rope; the same vertical motion also locking or releasing the cutter-head from the rotating string of tubes. The special arrangement of the surface driving are detailed, including worm gear, three-jaw clamps, brake, &c. For soft strata a conical shell-borer is described with an expanding side-cutter; and in cases where cores are not required, the head carries a number of eccentric rollers which press the material back from the tubes as they rotate; the discs can be brought to a central position for withdrawal. In hard ground, cores are broken off and gripped by an eccentric ring, which is rotated when required.

TEAT-PROBE FOR COWS.—Classes 32, 36, 81—5747: Robert Caldwell, of Auckland, New Zealand, engineer. "A Probe Instrument for rendering easier the Milking of Cows and other Female Animals." Date under international arrangements, 9th May, 1900. Date of filing, 1st November, 1900. (Drawings, 7s. 6d.; specification, 9s.) A tapered canoidal probe has a guard flange to regulate the depth of insertion into the teat, a slot between the guard and probe carries a pair of lancets that are normally inside the slot, and can be extruded after the insertion of the probe in the teat, so that on the withdrawal of the probe they will cut through the obstructing growth.

COMBINATION CULTIVATOR AND SOWER.—Class 28—5752: Frederick Gale, of High street, Lancefield, Victoria, engineer, and Johnston Hemphill, of Lancefield, Victoria, farmer. "Improvements in the System of Sowing, Manuring, and Harrowing in combination with Ploughing, and in Attachments to ploughs for conducting any of these operations simultaneously with ploughing." Dated 3rd November, 1900. (Drawings, 17s. 6d.; specifications, 16s.) Each ploughshare is followed by a hollow drill and three harrow plates, which are allowed a slight amount of motion and adjustability in the connections to the plough, and have renewable wearing parts. Above each hollow drill a two-compartment hopper for seeds and friable manure is fixed. The seed is fed by a rotating wheel with groove or pockets, and the manure is fed by a cupped wheel revolving between two plates. Motion is transmitted to the feed-wheels by shafts, chains, and worm-gear from the furrow-wheels of the plough. Adjustments are provided for quantity of manure and of seed fed into the furrow, and for removing obstructions.

NEW PROCESS FOR PRESERVING MEAT.

Dr. Wilhelm Lanwer, who has long devoted his attention to the field of bacteriology, and is part proprietor of a chemical laboratory in Hamburg, has (says a European paper) discovered a new process for preserving meat. This process has been put to the test in provisioning the ships that transported the German troops to China. In this new process the meat, after having been most carefully examined, is surrounded by a layer of fat and is then encased in a gelatine-like congealing mass. It is immaterial whether the meat be raw, cooked, or salted down. It will keep fresh and eatable for years. The inventor has sent meat to the hottest parts of the world, and tests of all kinds are continually being made in this direction. From the little that is already known of the process, it is evident that it has the same tendency as that invented by Emmerich, for here, too, a careful aseptic treatment is the first step, which is then followed by a germ-proof encasing; only, in the new process, as the *Illustrierte Landwirthschaftliche Zeitung* writes, the security against the germs is attained by excluding the air, whereas in the other it was done by an anti-septic impregnation of the outward casing.

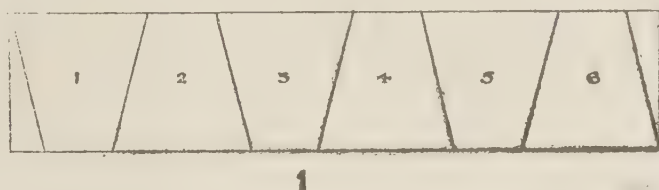
General Notes.

HOW TO MAKE A SIMPLE WINDMILL.

By H. R. STEPHENS, Toowoomba

The mill, of which diagrams are here given, is 5 feet in diameter. The design is my own, and has been tested satisfactorily under somewhat adverse circumstances.

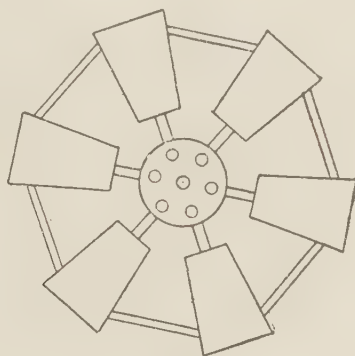
Sails.—Taking the construction of these first, select a piece of sheet iron of, say, 20 or 22 gauge, and mark it out thus into six sections:—



1

A sheet of iron 6 feet $\times$ 3 feet will cut this number with the least waste.

The sails, being cut out, should be bent to a slight curve and rivetted on to an arm of about $1\frac{1}{4}$ -inch $\times$ $\frac{1}{8}$ -inch iron, of which the ends are shaped thus—



2 and 3

and bolted between two $\frac{3}{4}$ -inch galvanised iron flanges with $\frac{5}{16}$ -inch bolts. The outer edges of the sails should have a light piece of hoop-iron $\frac{1}{16}$ -inch thick to connect them together. This completes the sail wheel.

Gear.—For this size of windmill the entire gear is composed of $\frac{3}{4}$ -inch pipe and fittings, or, if a larger mill is wanted, proportionately heavier pipe and fittings may be used.

The following is a list of the pipe and fittings of my mill, of which a sketch is given below:—

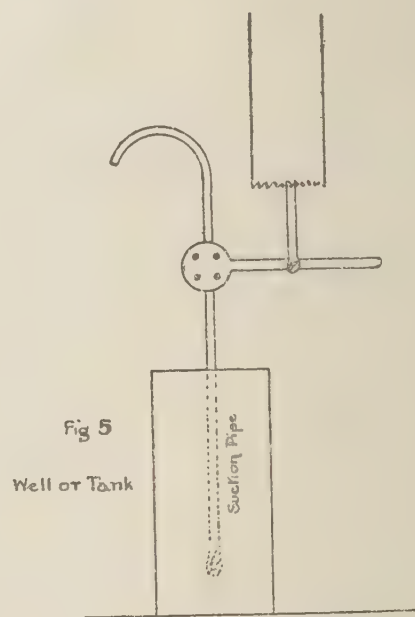
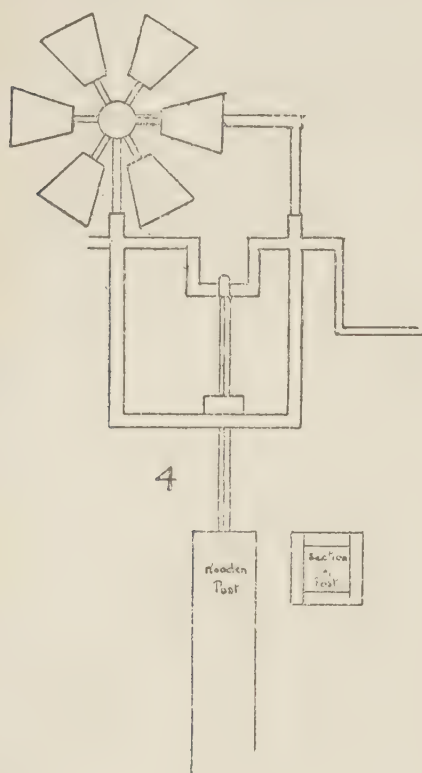
Fittings required—

2 $\frac{3}{4}$ crosses	3 $\frac{3}{4}$ -inch tees
3 $\frac{3}{4} \times \frac{1}{2}$ reducing elbows	1 $\frac{3}{8}$ -inch tee
3 $\frac{1}{2}$ -inch elbows	1 $\frac{1}{2} \times \frac{3}{8}$ -inch reducing tee
2 $\frac{3}{4}$ -inch „	

And, say, 20 feet $\frac{3}{4}$ -inch pipe.

Two $\frac{3}{4}$ -inch crosses and two tees should be punched open by a blacksmith to form journals for $\frac{3}{4}$ -inch pipe.

There is no vane required, as the mill can be set at any degree by means of a lever inserted in $\frac{1}{4}$ -inch holes bored at the end of the pipe, and which passes through the wooden post to within 3 feet of the ground, where it may be



easily got at. I will write no more at present, and merely add that £5 would cover the whole cost of the windmill, and the cost would be less if the farmer is handy with tools.

THE ZEPHYR VANELESS WINDMILL.

DETAILED SPECIFICATION.

Wheel of Mill.—For the hub, get two $\frac{3}{4}$ -inch galvanised iron pipe flanges. Drill six $\frac{5}{16}$ -inch holes, and insert the 1 inch $\times$ $\frac{1}{4}$ -inch flat iron spokes between. Rivet six blades made out of 22-gauge iron to spokes after first cutting them to shape in sketch.

Gear to Work Pump.—Consists of a crank shaft of $\frac{3}{4}$ -inch galvanised iron piping with elbows and tees to fit together. The throw of crank for this size mill is about 3 inches. The diameter of wheel is 5 feet. The connecting link from crank-pin is about 8 inches, and the $\frac{5}{16}$ -inch round iron rod to attach to lever of pump is suited to the height of the windmill-stand.

Pump.—The pump is a No. 1 wing valve pump, obtainable from Messrs. Lassetter for 25s. It is strongly made, and just suits the mill. The capacity is approximately 300 gallons per hour.

Fittings.—Consist of all pipe fittings, $\frac{3}{4}$ -inch being used for this size. They make the gear extremely light, and wear a fair time, being cheaply replaced.

DIRECTIONS FOR WORKING.

1. *Oil Well.*—Lubricate bearings and inside of pump occasionally by removing plug.

2. *Start Easy.*—Take out the starting peg, and, if the mill does not start at once, go up the ladder and turn off the centre. It should then start.

3. *Set Steady.*—Set the mill to the wind by the peg and sett screw. Adjust so that it works steadily and not too fast.

4. *Stop Carefully.*—To stop. Release the sett screw, and let the mill go out of wind. When stopped, put in the peg to lock.

5. *Use Intelligently.*—Take up wear as it occurs, and you will have less wear to take up afterwards.

WHAT TO DO IN EMERGENCIES.

If a woman's dress is suddenly enveloped in flames, instead of running to her, or out of the house, speak distinctly and commandingly: "Lie down and roll over!" Meantime rip up the carpet, or drag off a bed-blanket, throw it over the person, and proceed to wrap her up closely in it; this is a more certain and speedy extinguisher than water, is more accessible, and entirely safe to the person giving aid.

If a man faints away, instead of yelling out like a savage, or running to him to lift him up, lay him down at full length on his back on the floor, loosen the clothing, push the crowd away so as to allow the air to reach him, and let him alone. Dashing water over a person in a simple fainting-fit is a barbarity, and soils the clothing unnecessarily. The philosophy of a fainting-fit is, the heart fails to send the proper supply of blood to the brain; if the person is erect, that blood has to be thrown uphill, but, if lying down, it has to be projected horizontally, which requires less power.

If a person swallows a poison, deliberately or by chance, instead of breaking out in multitudinous and incoherent exclamations, dispatch someone for a doctor; meanwhile run to the kitchen, get half-a-glass of water in anything that is handy, put into it a teaspoonful of salt and as much ground mustard, stir it an instant, catch a firm hold of the person's nose, the mouth will soon fly open, then down with the mixture, and in a second or two up will come the poison. This will answer in a larger number of cases than any other. If by this time the physician has not arrived, make the patient swallow the white of an egg, followed by a cup of strong coffee, because these nullify a larger number of poisons than any other accessible articles as antidotes for any poison remaining in the stomach.

If a limb or other part of the body is severely cut, and the blood comes out by spurts or jerks, per saltem, as doctors say, be in a hurry, or the man will be dead in five minutes; there is no time to talk or send for a physician; say nothing, out with your handkerchief, throw it around the limb, tie the two ends together, put a stick through them, twist it around, tighter and tighter, until the blood ceases to flow. But stop, it does no good. Why? Because only a severed artery throws out blood in jets, and the arteries get their blood from the heart; hence to stop the flow, the remedy must be applied between the heart and the wounded spot—in other words, above the wound. If a vein had been severed the blood would have flowed in a regular stream and slowly, and, on the other hand, the tie should be applied below the wound, or on the other side of the wound from the heart, because the blood in the veins flows towards the heart, and there is no need of such great hurry.—*National Educator*.

A CURE FOR EARACHE.—"I am afraid I have greatly interfered with my own practice," said a celebrated aurist, "by giving the following advice to many of my friends:—At the first symptoms of earache, let the patient lie on the bed with the painful ear uppermost. Fold a thick towel and tuck it around the neck; then, with a teaspoon, fill the ear with warm water. Continue doing this for fifteen or twenty minutes; the water will fill the ear orifice, and flow over on the towel. Afterwards turn over the head, let the water run out, and plug the ear with warm glycerine and cotton. This may be done every hour until relief is obtained. It is an almost invariable cure, and has saved many cases of acute inflammation. The water should be quite warm, but not too hot."

HOW TO RELIEVE CHOKING.—Raising the left arm as high as you can will relieve choking much more rapidly than by being thumped on the back. Very frequently at mealtime and when they are at play, children get choked while eating, and the customary way of relieving them is to slap them sharply on the back. The effect of this is to set the obstruction free, so that it can be swallowed. The same thing can be brought about by raising the left hand of the child as high as possible, and the relief comes much more rapidly.

HOW TO MAKE GOOD BEER.

This recipe will make 200 gallons of good beer: We fill the furnace the night before we brew, which holds about 150 gallons of water: we get up at 3 o'clock the next morning, start the fire, and boil the water till it boils quite fast, then lead the water out into "mash tub," let it cool to 170 degrees, then add 15 bushels of malt, then let that stop for two hours, making the furnace boil up again in the meanwhile with another lot of water, the same quantity as before. After taking the first mash off into vats, return the sweet-wort into them, after drawing the second lot of water out, which must be put on the same malt again; then add 9 lb. of hops to the sweet-wort, and boil them well for two hours or more as rapidly as possible, pressing them down and stirring to prevent it boiling over, then lead it off into coolers, and do exactly the same with the second furnace as the first, only using 9 lb. of hops. When done, mix altogether in the big mash tub. After you have well strained the whole, let it cool down till it is 70 degrees; then add yeast, which will cause it to work. It must be skimmed for three days.

CHROME TANNAGE.

Among the noteworthy features of the trade of Madras last year was a large increase in the export of hides and skins to the United States, the active American demand being ascribed to the growing popularity of chrome tannage. This process is said to produce rapidly a leather which, for many purposes, is superior to the ordinary article. The large export of raw skins is to be regretted, as excellent tanning is done in Madras.—*Engineering*.

SIMPLE HOME REMEDY.

Onion juice is one of the most effective remedies for ear-ache. To prepare: Wrap a large onion in heavy wrapping-paper, wet it thoroughly, and roast in the coals. When tender strip off the skin and squeeze out the juice by twisting in a thin cloth. Bottle and save for use. When needed, pour one or two drops in a spoon, warm a little, and drop into the ear. Afterward put in a bit of warm cotton to exclude the air. It rarely, if ever, fails to effect a speedy cure.

MARKETS FOR BUTTER.

Small shipments of butter continue to be made to Hongkong and Japan, and the trade is a growing one. There is one point that shippers will have to watch very carefully, and that is not to allow shipments to cease during the winter months. If the palates of the inhabitants of the East are to be cultivated in the direction of including butter in their industry, it is essential that the practice should not be erratic. There is also another reason why this new market should be carefully catered for. The Americans have had a watchful eye in that direction for some years. The United States Consul at Chung King, China, has recently forwarded a very interesting report to his Government on this subject. He says that butter and cheese were imported into Shanghai during 1900 from France, Denmark, Australia, Sweden, and the United States to the value of £20,000. The butter was imported in tubs, in tins of $\frac{1}{2}$ lb., 1 lb., and 2 lb., and in common quart fruit jars, holding 2 lb. Some of the best butter came in fruit jars from California. It retailed at 3s. 7d. per jar, being the highest-priced butter sold, and on that account it was not extensively used. The weight of the jar and necessary packing made the freight much greater than on butter in tins, and, besides, the latter were preferred. Australian butter retailed at 2s. 6d. per lb. in 1 lb. and 2 lb. tins. There is no import duty on butter. A good brand of butter that was once established and maintained its quality could count, the consul considered, on a permanent and increasing trade.

CATTLE THAT NEVER DRINK.

An exchange says :—There are hundreds of horses and thousands of cattle in the Hawaiian Islands which never take a drink of water throughout the whole course of their lives. On all the islands the upper altitudes of the mountains are given up to cattle ranges. The cattle run wild from the time they are born until they are sent to the slaughter-house. Except possibly two or three months in the rainy season, there are no streams or pools of water in any parts where the cattle range, but everywhere there grows a recumbent, jointed grass known by the name of “maninia.” This is both food and drink. Horses and cattle grazing on it neither require water nor drink it when offered. —*Journal of Western Australia.*

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

 Answers to Correspondents.

GRIT FOR POULTRY.

W. EVANS, Rocklea.—There is not the slightest danger in giving pounded glass to poultry. As endorsing what we said on this subject in the last number of this *Journal*, we give you the following extract from *Station, Farm, and Garden* :—Much of the foraging done by fowls is more for grit than for food. Do not content yourself with the fact that your hens have a gravel run, for hens do not pick up gravel for grit unless it is sharp. They may be but a week on a gravel bed, and yet in that short time a large flock will clear it of the material they require, as is shown by their constant search for sharp material, which they always need. Yet there are those who have kept hens in large numbers on one place for years, without supplying them with any, and when the hens become sick from indigestion they resort to poisonous nostrums. Keep a box of pounded glass where your hens can always get at it. Perhaps some may smile when advised to give pounded glass to the hens, but try it and notice how readily they will eat it, and you will wait quite a long while if you expect any of them to die from eating the glass. Anything that is hard and sharp will answer. The hard pearly portions of oyster-shells make an excellent grit, but they lack hardness, though they are better than nothing at all. Pounded bones are a delicacy to any flock of hens, and this is a material which is available at the cost of a little trouble in every household. Remember, fowls cannot lay well unless kept healthy, and cannot be kept healthy without grit.

GRIPES IN HORSES.

NEW CHUM, Esk.—We give you a recipe for gripes in horses, furnished by a well-known English veterinary surgeon to an inquirer in the *Farmer and Stockbreeder*. You should cut out all recipes given by good authorities in the *Journal* and keep them by you, but, better still, have your *Journals* bound in half-yearly volumes. We will furnish you with a good board cover for 6d :—

Gripes are caused by a variety of things, many of which are avoidable, but often forgotten, even by good horsemen, whose minds are too much occupied with other matters to see that a sufficiency of bran or other laxative food is given in winter, and that the horses are not allowed to burst themselves with

green meat in summer. For general use among farm horses, and where some obstruction is likely enough to be the cause, the following is a good formula; but a horse which has had it should not be worked the next day, although he may appear to be perfectly well:—

Barbados aloes in solution, 6 dr.

Spirit of turpentine, 2 oz.

Sweet spirit of nitre, 1 oz.

Compound tincture of morphia and chloroform, 4 dr.

Linseed oil, $\frac{1}{2}$ pint.

Mix with a pint of thin gruel, and drench slowly.

If the patient is feeding on green meat, and the bowels are known to be in soft condition, leave out the aloes.

T. SPENCELEY, State School, Newtown, Ipswich.—Our valued correspondent, Mr. H. Simpson, junr., furnishes the following replies to your questions:—

Question 1.—Are pounded oyster shells good for fowls, for shell production; and what else is good also?

Answer 1.—Pounded oyster shells are useless for egg-shell formation, the reason being that the lime, &c., contained in them is in an insoluble form, and can no more be digested by the fowl than can the small pieces of glass stones, &c., picked up by her at random, but they are excellent as grit, and fowls seem to prefer this kind to any other. Green cut bone, together with wheat, contain large quantities of lime in a digestible form, and are, therefore, best for this purpose.

Question 2.—Are bread crusts and wheat with the grass they eat sufficient for good egg-production?

Answer 2.—Hens fed on bread crusts and wheat will lay fairly well, provided plenty of sharp grit is supplied, but to obtain best results meat in some form should be given twice or three times per week.

Question 3.—How often should crushed green bone be given, and how is it that fowls do not like it at first?

Answer 3.—Green cut bone can be given every second day, allowing 1 oz. to each adult fowl. When freshly cut, a little pollard mixed with it will cause it to keep better, and it will also be found that the hens eat it up quite clean, even if it has not been fed before.

Question 4.—Is boiled liver chopped up good for fowls once a week?

Answer 4.—Yes.

Question 5.—Where could a setting of Black Hamburg eggs be obtained?

Answer 5.—Settings of Black Hamburg eggs may be obtained of H. Simpson, junr., Pialba road, opposite St. Helen's School, Maryborough.

INDEX.—The temperance drink you inquire about is made in France, under the name of "Piquette." It is said to be a sparkling, fruity beverage, composed of dried apples, raisins, and water. This combination is allowed to stand till fermentation takes place, and is then bottled, with the addition of a little sugar, or served directly from the cask. It is not only very good, but cheap, and cheers, but does not inebriate, unless taken in inordinately large quantities. The recipe is as follows:—5 lb. raisins, 5 lb. dried apples, 5 gallons water. Put in an open cask, and let stand three days. Bottle with a half-teaspoonful of sugar and a bit of cinnamon in each bottle.

Silo.—From 30 to 35 lb. a day is sufficient for a cow. An American writer, however, says that 6 tons must be allowed for each cow per half-year to allow for unavoidable waste.

LOWOOD asks :—

Question 1.—How many lb. of milk at 3 test will it take to make 1 lb. of cream testing 40 ?

Answer 1.—13·3 lb.

Question 2.—How many lb. of milk at 4 test will it take to make 1 lb. of cream testing 40 ?

Answer 2.—10 lb.

Question 3.—How many lb. of cream at 40 test would it take to make 1 lb. butter ?

Answer 3.—2·2 lb.

Question 4.—How many lb. of grain should be sown per acre of the following cereals :—

(a) Wheat for grain ?

Answer.—40 to 50 lb., according to moisture and condition of soil. Planted with seed-drill, only half the quantity.

(b) Wheat for green feed ?

Answer.—60 to 70 lb.

(c) Oats for hay ?

Answer.—40 lb. broadcast, 25 lb. drilled.

(d) Barley for greenstuff ?

Answer.—60 lb.

(e) Rye for green feed ?

Answer.—50 lb.

Question 5.—What is the weight of a bushel of peas ?

Answer 5.—60 lb.

Question 6.—What is the best Queensland wood for making whip-handles ?

Answer 6.—Myall, brigalow, and rosewood.

Question 7.—What is the common name for chloral hydrate ?

Answer 7.—No common name.

Question 8.—What is the shrinkage in weight of lucerne growing in the field to hay ready for market ?

Answer 8.—It is impossible to give an accurate estimate. A great deal depends on the condition of the lucerne when cut. A total crop of 10 tons 3 cwt. of green lucerne at Wagga Wagga (N.S.W.) Experiment Farm made 3 tons of hay.

9. The cubic content of a gallon of water given in our February issue is Hawaiian measurement. British measurement is 277·274 cubic inches.

Orchard Notes for April.

By ALBERT H. BENSON

The Orchard Notes for March dealt largely with citrus fruits, especial attention being drawn to the importance of taking every precaution, now that the fruit is reaching maturity, for preventing its destruction by the various pests that attack the ripening fruit. At the same time I pointed out the necessity for the proper handling, sweating, and packing of the fruits, in order that it shall be placed on the markets either of this or the other Australian States in the most attractive manner and best possible condition. All that I stated in last month's Notes applies with equal force to the present month, and in fact as long as the citrus season continues, so that I need not repeat what I then wrote, but will simply draw the attention of all citrus-growers to the importance of my remarks, as it is useless to take every care throughout the year to keep the trees well pruned and free from disease and the orchard in a high state of cultivation if we do not do our best to protect the result of such work and to market it to the best advantage.

With the exception of the marketing of citrus and a few other fruits—such as persimmons, pines, bananas, custard apples, &c.—April is a somewhat slack time for fruit-growers, especially those who depend on deciduous fruits, so that the opportunity should be taken to clean up the orchard before winter, and to finish up any odd jobs that have been neglected during the previous months. Such work will consist of looking after all fences, drains, headlands, &c.; the casting back of soil round trees where same has been washed away by the heavy summer rains; the ploughing in of all weeds and trash that have accumulated in the orchard during the wet season; the removal of all dead or worthless varieties of trees that it is desirable to get rid of; and any other work—such as the collection of material for and making of compost heaps—that may be necessary.

Cyaniding for all kinds of scale insects may be continued during the month, taking care not to treat any trees bearing fruit when same is either wet with rain or heavy dew, as, if treated under these conditions, the fruit is apt to be marked.

Strawberry-planting can be continued during the month, but the planting of all kinds of fruit trees should be delayed till the wood has been thoroughly matured. Keep the nursery clean, see that all young buds are growing properly, and that all unnecessary shoots are removed; the young tree being trained to one straight stem till high enough to form the future head of tree, when it should be topped.

Farm and Garden Notes for May.

Farm.—Most of the land intended for cereals should by this time have been ploughed and made ready for sowing. Where such is, however, not the case, no time should be lost in carrying on the work.

Sowings will already have been made, and may continue to be made during the month, of wheat, barley, oats, rye, vetches, pasture grasses, and lucerne. See that all potatoes are earthed up. Cut tobacco as it ripens. Should any cotton be grown, picking must be carried on during the warm part of the day, when the cotton is thoroughly dry. Spread it out on tables or tarpaulins to dry before housing. Farmers who intend cotton-planting should lose no time in making arrangements for a supply of seed, the price of which is rapidly rising owing to the establishment of extensive oil-mills in America. The price of cotton also promises to keep up. It is now 11 cents ($5\frac{1}{2}$ d.) per lb. on the plantations in the United States. Prepare for winter feeding of stock by chaffing all kinds of greenstuff into the silo. Silo stacks may also be made with advantage and at small expense.

Coffee-picking must be pursued vigorously. Strawberries may be planted out. Pink's Prolific, Aurie, and Marguerite are good varieties. Six thousand plants are required for an acre. In some localities strawberry-planting is concluded in March, when the plants begin to bear in August.

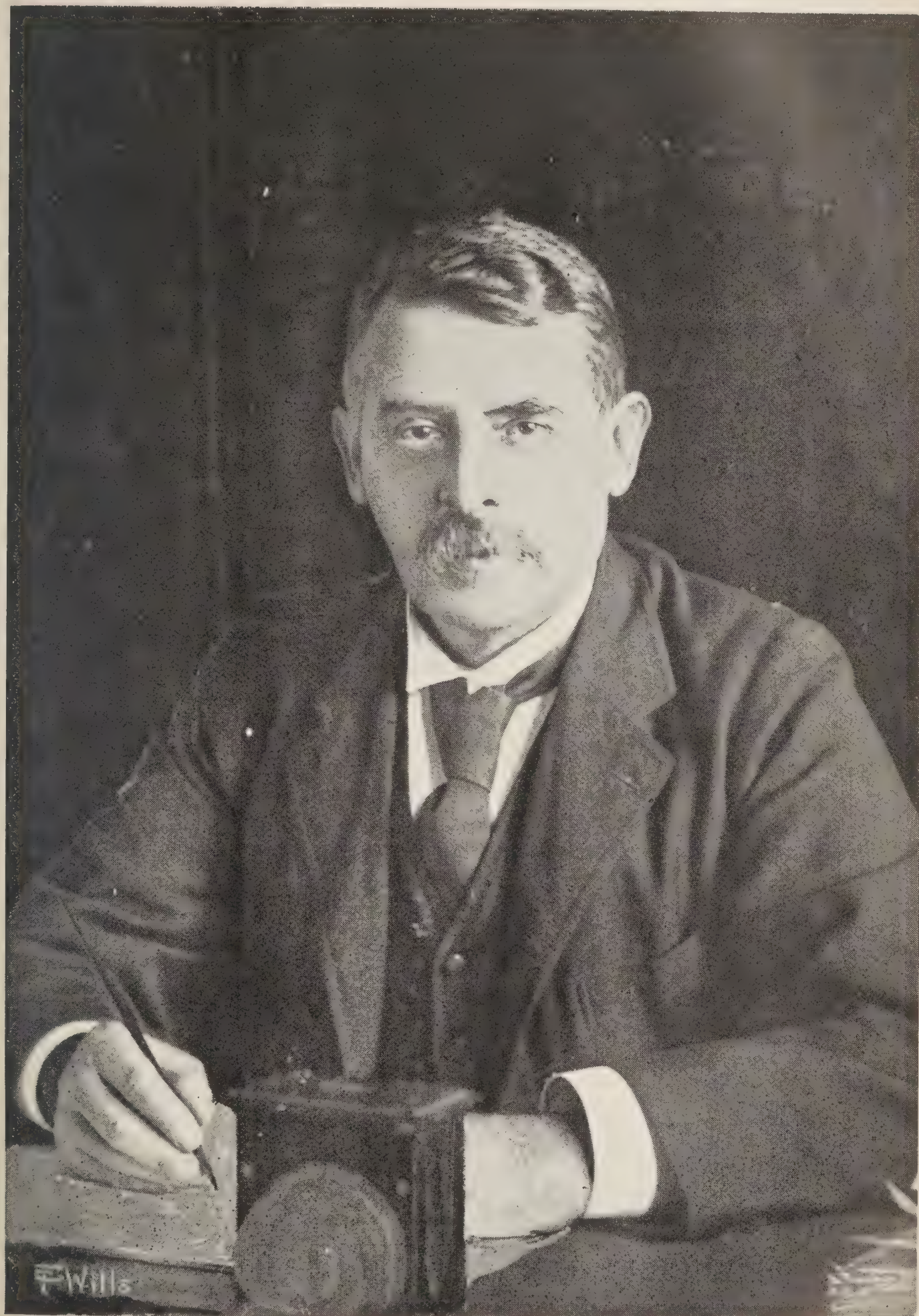
Kitchen Garden.—Onions sown in seed beds should now be planted out. See that the ground is thoroughly cleaned and pulverised beforehand. Good returns have been had from seed sown in April. Dig and prepare beds for asparagus. Choose a deep sandy loam, dig it deep (18 inches), manure it well, and add a sprinkling of salt a month before the planting season, that the rain and atmosphere may act on it. Then peg out the beds 4 feet wide, leaving a path 2 feet wide on each side of the bed. Plant four rows in each bed, keeping the front rows 9 inches from the side. Cover the crowns at least 3 inches with good loose soil and manure mixed, and rake to a smooth surface. The plants must be 15 inches apart. For old beds, cut the stalks down in May and dig the beds lightly over with a fork. Then lay over them a good dressing of manure. In September you may begin to cut; to ensure the blanching of the tender shoots, they may have earthen pipes or bamboo joints placed over them.

Sow beans, peas, carrots, lettuce, radish, parsnips, beet, leek, rhubarb, herbs, cabbage, spinach, mustard and cress, &c.

Should showery weather continue, planting and transplanting may be done at once, as the plants will be established before frosts set in.

The directions for March and April are equally applicable to this month. Cut back and prune all trees and shrubs ready for digging. Take up dahlia roots and store them in a dry place. Plant bulbs as in March, such as anemones, ranunculus, freesias, ixias, iris, narcissus, &c.

As the weather is now sensibly cooler, all shades and screens may be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the hoe going on the walks. Clip edgings and hedges.



THE LATE HON. J. V. CHATAWAY, M.L.A.

Minister for Agriculture.

The Hon. J. V. CHATAWAY, M.L.A.

It is with the deepest regret that we have to record the untimely death of the Hon. J. V. Chataway, Secretary for Agriculture. The honourable gentleman, who was the senior member for Mackay in the State Parliament, had a long and varied experience in the State which peculiarly qualified him for the responsible portfolio of Agriculture. He was a son of the Rev. James Chataway, rector of Rotherwick, Hampshire, England, and received his education at Winchester College. In consequence of ill-health from over-study, he came out to Australia. Arriving in what was then the colony of Queensland, he engaged in various pursuits connected within mining, pastoral, and agricultural industries, and for some time was part proprietor of the *Mackay Mercury* and the *Mackay Sugar Journal*. The late honourable gentleman first entered Parliament in 1893 as junior member for Mackay on the Ministerial side. At the general election of 1896 he was again returned for the same constituency. He succeeded the Hon. A. J. Thynne as Secretary for Agriculture in 1898, and it was not long before his rare faculty for organisation made itself felt throughout the Department. In all its branches he was thoroughly at home, and his conduct of the Annual Farmers and Fruitgrowers' Conferences won the admiration of all engaged in rural pursuits. On these occasions, when questions on the most diverse subjects were poured in upon him, he was always ready with his replies, which were full of sound information and advice, and were often delivered in a light and pleasing manner which impressed his audience with the greatest confidence. On all matters connected with stock, with agriculture and other rural pursuits, he possessed an apparently inexhaustible fund of knowledge upon which he was only too pleased to allow those interested to draw to any extent. In the interests of agriculturists, he travelled over every portion of the State, and thus gained an intimate knowledge of all that pertains to agriculture.

His versatility did not stop, however, at the operations of the field. He was a keen commercial man, and this ability to take up and carry to a successful issue the many and often intricate business transactions of the Department has many times proved of infinite value to the State.

In him, agriculturists of all classes have lost a sincere and sympathising friend, and one who was able and at all times willing to give them the best of advice. The departmental officers have also to deplore the loss of a chief who ever took the greatest interest in their work and welfare, and who has been taken from them when he was at the very height of a most useful and successful administration.

Agriculture.

AGRICULTURAL INSTRUCTION FOR VILLAGE YOUTHS.

In our last issue we (*Tropical Agriculturist*, Ceylon) took over two interesting articles on this subject, but had no opportunity of adding our own views. As might have been inferred, however, from the absence of comment on our part, we are entirely in sympathy with the movement that has found favour in England, as well as the Australian and West Indian Colonies, and do not hesitate to say that the system of agricultural instruction in rural schools may be expected to be as fruitful of good results in Ceylon as elsewhere.

It must be borne in mind that what is aimed at by this new scheme is not technical education in the science and practice of agriculture, but rather the directing of the young mind to the study of Nature, so that the natural surroundings of the village lad may present new beauties and fresh interests and possibilities to him and reconcile him to the so-called dull monotony of a country life.

To most of our village population the germination, development, and reproduction of vegetation are a mystery, and the realisation that plants are living and breathing organisms, performing all the vital functions of such, must come as a great revelation to the majority of our rural friends. A knowledge of the forces of Nature as they work through plant and soil, the wonderful adaptations of these forces and the inter-dependence of the mineral, vegetable, and animal kingdoms is what is wanting in the villager who sees nothing of design and recognises little of the sequence of cause and effect in his "common round and daily task." Under such circumstances, is it any wonder that he becomes discontented with his lot, which he is wont to associate with manual labour pure and simple? Jerome, in one of his books, has a beautiful passage referring to the companionship of plants. It is this companionship which the new scheme seeks to establish in order that the life of the rustic may present a new charm for him which so long it lacked, and his environment appeal to his instincts in a manner that he has never experienced before.

An intelligent knowledge of Nature in her various phases should be so much power in the possession of the youth of the village, which he will be able to use to his advantage. With such knowledge his lot will be infinitely more congenial to him, his prospects more cheerful, and (what is devoutly to be wished) his inclination will be to remain amid his rural surroundings and apply himself to the cultivation of the land with a new zest. Thus it is to be hoped will the people of the country be led to develop its agricultural resources, and, while the cities are relieved of the congestion of disappointed place-seekers, the country be made the home of the industrious and contented husbandman bent on making the most of his newly-recognised opportunities. We trust the hope will be realised.

BRISBANE WHEAT SALES.

The sale of wheat by public auction is a new institution which has been initiated by Morehead's Limited.

Last month this enterprising firm offered 5,560 bushels of wheat for sale. Samples of the bulk grain were shown in the saleroom previous to the sale, and much interest was exhibited by the numerous intending purchasers in attendance. Mill-owners from Brisbane, Rockhampton, and Warwick were in attendance.

The lots offered of various varieties of wheat ranged in quantity from 10 bags to 200. Of the total quantity not a single bushel was sold, as the reserve price was not reached. During the day, however, we learn that several parcels

changed hands. The Corn Exchange of Morehead's Limited will continue to operate. All beginning is difficult, and no discouragement need be felt over the first operations of the Exchange. Farmers require to be educated to this kind of business. One of our exchanges puts the matter tersely and clearly thus:—

“Buyers and sellers have both got to learn something. When Sydney wheat can be landed in Brisbane at 2s. 10d., can the grower of a similar article demand 2s. 8d. at Jondaryan with any hope of getting it, seeing that it costs 3d. per bushel to bring down to Brisbane? On the other hand, a buyer at auction is bound to bid up to current market value, or otherwise no sale will take place.”

The following lots were offered:—

To be delivered at Roma street: 40 bags Budd's Early, 2s. 10d. per bushel.

To be delivered at Jondaryan: 160 bags Marshall's No. 3 (2 bushels only per bag), 2s. 5½d.; 144 bags Budd's Early (2 bushels only per bag), 2s. 5d.; 25 bags Pugh's Prolific, 2s. 4½d.; 80 bags Ward's Prolific, 2s. 5d.; 30 bags Ward's Prolific, 2s. 5d.; 35 bags Ward's Prolific, 2s. 5d.; 42 bags Ward's Prolific, 2s. 5d.; 60 bags Talavera and Allora Springs (equal quantities), 2s. 5d.; 30 bags Jubilee, 2s. 5d.; 200 bags Baltimore (2 bushels only per bag), 2s. 5d.; 102 bags Murdoch's Bluff, 2s. 5½d.; 108 bags Ward's Prolific, 2s. 5d.; 184 bags Allora Spring, 2s. 5d.; 163 bags Gluya's Early, 2s. 5d.; 79 bags Talavera, 2s. 5d.

To be delivered at Wallumbilla: 10 bags Marshall's No. 8, 2s. 2½d.; 150 bags Marshall's No. 3, 2s. 2½d.

GREEN MANURE AND NITROGEN.

Swedish investigators have been engaged in testing the importance of different green-manuring crops in the economy of soil nitrogen during the fall months. Pot experiments were made with buckwheat and yellow mustard, and with the legumes, the field pea, common vetch, hairy vetch, Roman vetch, yellow lupine, blue lupine, white lupine, common kidney vetch, serradella, *Melilotus alba*, and red clover.

The pots were filled with soil of a very light character, poor in humus and other fertilising constituents, having been taken from a field on which crops of rye, barley, three years' pasture and oats and superphosphate corresponding to the contents of potash and phosphoric acid in a good crop of clover was added to all pots. The seeding and harrowing-under of the green manure crops were done at such a time and in such a manner as would obtain in field work.

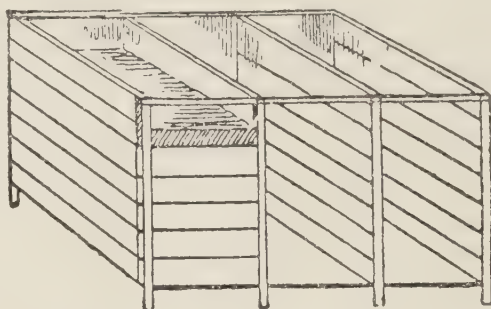
The results show that buckwheat caused a loss of 126 lb. of nitrogen to the acre, and that yellow mustard caused a loss of 49 lb. of nitrogen to the acre. The legumes without exception increased the amount of the nitrogen in the soil.

The field pea added 131 lb. of nitrogen to the acre, the common vetch 60, the hairy vetch 47, the Roman vetch 134, the yellow lupine 22, the white lupine 47, the trefoil 49, the serradella 35, and the melilotus 88 lb. to the acre. Thus the legumes supplied four to five times as much nitrogen during growth as did mustard and buckwheat, and left the soil richer at the end of the season by an increase of nitrogen equivalent to 15 loads of barnyard manure per acre.

The pots were placed under cover over winter, and in the spring sown to six-rowed barley. The results obtained at harvest time were rendered valueless through an accident, but the appearance of the barley throughout the vegetative period clearly showed the superiority of the legumes as green manures, and the small crops in the buckwheat and mustard pots were ripe while the barley plants in many of the legume pots, notably in the field pea and the common vetch pots, were still large and green.—Prof. H. C. Larsen, in *New York Farmer*.

SUBSTITUTE FOR A SILO.

A German farmer gives the following substitute for a silo: A box is built out of pine scantlings and $1\frac{1}{2}$ -inch boards, with the top and front open, the whole divided into three equal compartments, each to hold an entire day's feed for all animals, space being calculated on the basis of 2 cubic feet for each cow. A 3-inch layer of chopped hay and straw is now spread evenly on the floor of the first compartment; then follows a thin layer of sliced mangolds which have previously been mixed with the daily allowance of oilmeal and bran;



then another layer of chopped hay and straw, treading down firm as it grows up and setting in front boards as needed. When full, a board covering is put on. On the second day the next compartment is similarly filled, and on the third the last one. On the third day we commence to feed from the first compartment; this has now become thoroughly heated and has entered into a sweet fermentation, giving an agreeable odour to the whole mixture, and the avidity with which it is consumed proves that it is relished.—*Farmer and Grazier*.

INFLUENCE OF WHEAT FARMING UPON SOIL FERTILITY.

[From the Proceedings of the Society for Promotion of Agricultural Science held at New York, 1900.]

By HARRY SNYDER, B.Sc., University of Minnesota, St. Anthony Park, Minn.

Sir William Crooks, in his presidential address before the British Association for the Advancement of Science, in 1897, predicted that before the close of the next century a wheat famine would exist. He based his views upon the following statements:—(1) The wheat-producing soils are becoming exhausted; (2) there are no large areas of new land to take the place of the old, worn-out wheat soils; and (3) the consumption of wheat is rapidly increasing. Sir William Crooks is not the only one who has believed that the time will come when our agricultural soils will fail to produce food for the human race. Baron von Liebig, as late as 1840, entertained similar views.

Since wheat forms such a large part of the food of civilised man, any factor which would tend to decrease its supply is one of no small importance. In discussing the problem of wheat production, the influence which wheat-farming has had upon the fertility of the soil naturally claims our attention. Is the fertility of our wheat farms becoming seriously impaired? In the discussion of this question the method of cultivation which has been so universally followed will first be considered.

The native or virgin prairie soils are first broken, and a corn crop or some crop that is not injured by an excess of fertility is grown. After one or two corn crops the land is in condition for wheat. Wheat is then grown year after year upon the same land as long as a remunerative crop can be secured. After ten to twenty years' cropping, depending upon the character of the soil, the yield per acre noticeably declines, particularly during the so-called unfavourable wheat years. The straw and stubble are burned; no manure is used; shallow ploughing is practised; and in some cases the seed is drilled into the old stubble land without ploughing.

It would be difficult to obtain any data as to what influence this kind of farming has had upon the soil if it were not for the fact that in many places small areas of unbroken land are left adjacent to large tracts that have produced ten or more wheat crops. In the soil investigations at the Minnesota Experiment Station, many analyses have been made of old wheat soils and adjacent virgin soils. Opportunity is thus afforded to compare the chemical composition of old wheat soil with similar uncultivated ones. The work that has been done shows that there is a general uniformity as to the effect which continuous wheat culture has had upon the chemical composition of the soil. While a large number of examples could be given, only one will be considered in detail. In the discussion of the results which follow it should be remembered that while only one soil is being considered the results have been verified by the analyses of a number of soils from old wheat lands and adjoining new lands.

The soils No. 1 and No. 2, selected for the purpose of illustration, are from the Red River Valley region in Minnesota. No. 1 is uncultivated virgin prairie soil. No. 2 is from an adjoining field that has produced ten crops of wheat, two crops of flax being removed before the wheat cropping was begun. The chemical composition of these soils is given in the following table:—

TABLE NO. 1.
Composition of Soil.

					No. 1. Native Soil. Per Cent.	No. 2. After Ten Years' Wheat Culture. Per Cent.
Insoluble matter	...	...	...	...	47·64	55·12
Silica Soluble in Na ₂ Cl ₃	...	...	...	...	15·43	16·92
Potash	...	...	...	...	·54	·50
Soda	...	...	...	...	·45	·41
Lime	...	...	...	...	2·44	2·40
Magnesia	...	...	...	...	1·85	1·91
Ferric oxid	...	...	...	...	4·18	4·20
Alumina	...	...	...	...	7·89	8·81
Phosphoric acid	...	...	...	...	·38	·31
Sulphuric acid	...	...	...	...	·11	·10
Carbonic acid	...	...	...	...	2·42	2·45
Volatile matter	...	...	...	...	15·55	5·58
Total	...	...	...	...	98·88	98·71

(From Bul. 30, Minn. Agr. Station, p. 176.)

Table No. 1 gives the percentage amounts of mineral constituents of the two soils. An examination of this table shows that there is but little difference in the percentage amounts of phosphoric acid, potash, and lime in these two soils. In fact, there are no appreciable differences in any of the mineral compounds, except alumina and the insoluble matter, which are greater in soil No. 2. These are materials which take no part in plant nutrition, and the larger amounts in soil No. 2 are due to loss of organic matter during cultivation. When the figures are reduced to a uniform basis of volatile matter these differences no longer exist.

Before cultivation, the soil contained over 12,000 lb. per acre to the depth of 1 foot of both phosphoric acid and potash. Since a heavy wheat crop removes less than 50 lb. of potash and 40 lb. of phosphoric acid per acre, the ten wheat crops have removed less than 4 per cent. of the total amount originally present in the soil. It would appear that the decline of the soil in wheat-producing power is not due to a loss of any large amount of mineral matter, because over 96 per cent. of these elements remain in the soil. While the total amount of mineral matter has not been appreciably decreased by the ten years of wheat cropping, the form of the mineral matter, as will be considered later, has been materially changed.

The most noticeable difference between soil No. 1 (uncultivated) and soil No. 2 (the wheat cultivated soil) is in the volatile matter, which is composed of decaying animal and vegetable remains, and combined water, which forms a part of the hydrated silicates. The difference of nearly 10 per cent. between the volatile matter in the two soils is due mainly to the decay of the organic matter in the soil during cultivation. The main factors which have been most active in causing this loss of organic matter are: (1) Oxidation, (2) bacterial action, and (3) burning the stubble land.

Has this destruction of vegetable and animal matter in the soil had anything to do with loss of fertility and decline in crop-producing power? To answer this question, the composition of this organic matter and the part which it takes in plant nutrition must be briefly considered, and the effect which its return to the soil has upon the yield of wheat.

It is well known that the organic compounds of the soil do not contribute directly to the formation of the organic compounds in the plant. This has been proved by numerous sand and water culture experiments. About seventy-five years ago it was believed that the vegetable matter of the plant was formed from the decaying vegetable matter in the soil. Liebig's overthrow of the humus hypothesis of Thaer diverted attention from the study of the organic compounds of the soil.

Recent experiments have shown that in many soils the organic compounds take an important part, indirectly, in plant nutrition. Experiments have shown that decaying animal and vegetable materials, as manure, clover, and tankage, during decay form acid products. These organic acids are capable of uniting with the basic constituents of the soil to form neutral products or organic salts, which are termed "humates" (Bul. No. 53, Minn. Agr. Exp. Sta.) Experiments have also shown that some of these humates are capable of being assimilated and the mineral portion used as food by plants. The rôle of the organic matter in the soil thus appears to be (1) to combine with the mineral matter, and (2) to assist in making the mineral elements available as plant food. In some soils this action is checked for lack of suitable basic material, as lime, to combine with the acid products.

In a former paper (last year's proceedings of this association) a photograph was shown of wheat grown in a prepared soil in which the only forms of mineral food were humates—that is, the potash and phosphoric acid, instead of being supplied in the form of mineral salts, were present as organic salts or humates. Oats and rye have also been matured when the only mineral food was in the form of humates (Bul. No. 41, Minn. Exp. Sta.) These experiments have been verified by Nefedor, who has shown that crops grown on the black soils of Russia obtain a large part of their mineral food from that combined with the organic matter (Ex. Sta. Record Vol. 10, No. 4, Abstract). Thus it is that, while the vegetable matter of the plant is not produced directly from organic matter in the soil, decaying organic matter may combine with the mineral matter of the soil to form humates. Some of these humates are assimilated by plants, and the mineral portion is used for nutrition purposes. In many soils, particularly the prairie soils, the organic compounds are a potent factor in rendering the inert mineral matter available as plant food. The large amount of lime and alkaline matter in these soils prevents them from becoming acid; in fact, the organic matter in cases corrects alkalinity. The organic compounds of the prairie soils are of highly nitrogenous character. Analyses have shown that from 7 to 12 per cent. of this organic material is nitrogen. The accumulation of this nitrogenous organic matter has been the result of the action of vegetation for many years. In soil No. 1 the nitrogen is .38 per cent., and in No. 2, the wheat cultivated soil, it is .24 per cent. In some of the virgin soils of the north-west, the nitrogen content has exceeded .60 per cent. It would be impossible to believe that arable soils could contain such a high percentage of nitrogen if it were not for the fact that similar results have been obtained in more than one laboratory. In Lawes' and Gilbert's *Memoirs* is mentioned the high nitrogen content of the Manitoba soils, which

forms a part of this same region. Ladd, in the analyses of the Red River Valley soils on the North Dakota side, obtained similar results. From the soil analyses made at the Minnesota, North Dakota, and Canadian Experiment Stations, it is evident that many virgin soils contain over .5 per cent. of nitrogen; that is, the soils when first brought under cultivation contain more nitrogen than ordinary horse manure.

The influence of exclusive wheat culture upon the humus and nitrogen content of the soil will be observed from an examination of Table No. 2, which gives the nitrogen and humus content. Only a part of the organic matter of the soil is included under the head of "humus." Humus is that part of the organic matter which is soluble in a dilute solution of ammonia after the soil has been treated with a dilute acid. The Grandeau method, with slight modifications, was used for its determination. The total nitrogen was determined by the usual, Kjeldahl process. The total phosphoric acid in the humus represents the percentage of the total contained in the humus. For example, soil No. 1 contained .38 per cent. of phosphoric acid, and of this amount 25.03 was present in combination with the humus:—

TABLE No. 2.
Composition of Soils.

		No. 1. Native Soil.	No. 2. Long Cultivated Soil
Volatile matter (including organic) ...	...	15.55	5.58
Humus (Grandeau method) ...	...	5.34	3.12
Total nitrogen ...	...	.38	.24
Total phosphoric acid in humus ...	...	25.03	4.97

While Table No. 1 shows but little difference in the total amounts of mineral constituents in the two soils, Table No. 2 shows a decided difference in the organic constituents. The ten years' cultivation has resulted in a loss of .14 per cent. of nitrogen, or nearly 37 per cent. of the amount originally present. A similar loss of humus has occurred. The results show that, with the oxidation and other chemical changes which the organic compounds of the soil undergo, a similar proportional loss of nitrogen occurs, due to the oxidation of the nitrogenous humus. The loss of nitrogen has been the most serious one that the wheat soils of the north-west have sustained. If this loss of nitrogen were to continue at the same rate for twenty-five years, the soil would be practically depleted of its nitrogen. Fortunately, however, this heavy rate of loss does not continue for a long period. The heaviest losses occur when the soils are new and when they contain their maximum amount of nitrogen. As the soils become older and they contain less nitrogen, the rate of loss is materially less, but it still continues. The results show that during the first ten years of wheat cultivation heavy losses of nitrogen occur. Studies of the draft of the wheat crop upon the soil show that the largest yield of wheat removes less than 40 lb. of nitrogen per year from the soil. From these figures it is evident that there has been an annual loss of about 450 lb. of nitrogen per acre from soil No. 1, less than 50 lb. being removed in the crop, the remainder being lost in other ways. In some soils heavier losses have occurred.

The causes which have led to the losses of nitrogen are:—(1) Oxidation of the nitrogenous humus and liberation of the nitrogen as volatile or soluble compounds; (2) Rapid nitrification, due to favourable conditions, as large amounts of basic compounds and phosphoric acid in the soil; (3) The hastening of oxidation and nitrification processes by the practice of bare summer fallow; (4) The burning of the stubble in dry times and the fire not being confined to the stubble; (5) Losses by heavy wind storms that have denuded the land; and (6) Denitrification. By the combined action of these various agencies the nitrogen content of our richest soils has been rapidly reduced and unnecessarily large amounts have been lost.

The loss of nitrogen from old wheat soil can be observed from the appearance of the crop. On new land the growing crop has a richer and deeper green colour than on old land. This shows greater activity and more chlorophyll production in the wheat grown on the lands which contain the more nitrogen. It is largely this lack of nitrogen which has reduced the yield of grain.

The influence upon the quality of the grain has been less noticeable. Analyses of the grain grown upon new and old land show but little difference in nitrogen content, but a marked difference has been observed in the nitrogen content of the leaves and stems of the plant during growth and in the ultimate yield of grain.

The loss of nitrogen from the soil has resulted in decreasing the available supply. Experiments and analyses both indicate that the decline in yield when wheat is grown continuously upon the same soil is due largely to the loss of this element, not through the crop, but by oxidation and loss of the nitrogenous organic compounds of the soil.

The loss of organic matter from the soil has had its influence upon the supply of available potash and phosphoric acid. In the uncultivated soil (No. 1) there are over 2,500 lb. per acre of phosphoric acid in chemical combination with the humus and organic compounds. In the cultivated soil (No. 2) there are less than 700 lb. per acre. The two soils contain approximately the same total amount of phosphoric acid. The ten years of wheat cropping, as previously stated, has not materially changed the total percentage amount, but the loss of the humus and other organic compounds has changed the combination of the phosphoric acid from organic to mineral forms.

The potash has undergone a similar change. In short, over 20 per cent. of the total phosphoric acid and potash has reverted from organic to strictly mineral forms by the loss of humus. This change has undoubtedly resulted in making these elements less available as plant food, and has also been a factor in reducing the yield of grain, since these humate forms are more available as plant food than their mineral products.

The loss of organic matter has in turn influenced the physical properties of the soil, as colour, weight per cubic foot, power to absorb water, &c., as will be observed from Table No. 3:—

TABLE NO. 3.
Physical Properties.

	Soil No. 1. Uncultivated Soil.	Soil No. 2. Wheat Cultivated Soil.
Weight per cubic foot, lb.	61·	65·
Capacity to retain water, per cent.	75·	58·
Per cent. of water in soil 12 inches from surface	24·12	18·22

The ten years of wheat cultivation has changed the weight per cubic foot of the soil from 61 to 65 lb. This increase in weight is due to loss or shrinkage in the organic matter, and is in accord with the well-known law in regard to the influence of organic matter upon the weight of soils. While the method for the determination of the capacity to absorb water is known to lack perfection, the results are of value because the difference between the two soils in respect to capacity to absorb water is so great. This difference in power to absorb water is also verified by the moisture content of the soil. Not only is there a difference in the capacity to absorb water, but there is also a difference in the amount of water which the soils contain during the growing season. At the time the samples were taken from the field, soil No. 1 contained at the depth of 12 inches 24·12 per cent. water, while soil No. 2, the wheat cultivated soil, contained 18·22 per cent. The main facts which have been presented may be briefly summarised as follows:—

(1) When wheat is raised continuously on a soil for a number of years, only a comparatively small amount of mineral matter is removed, but the mineral matter undergoes a change in its chemical combinations.

(2) Exclusive cultivation of wheat causes a loss of organic matter from the soil, and along with this loss of organic matter there occurs a corresponding loss of nitrogen which is one of the elements that forms a part of the organic matter.

(3) In many cases ten years of exclusive wheat culture has reduced the nitrogen content of the soil over 30 per cent.

(4) The loss of the nitrogenous organic matter from wheat soils has changed the form of over 20 per cent. of the total phosphoric acid and potash, making these elements less available as plant food. The loss of the organic matter has changed the physical properties of the soil, making it less retentive of moisture and less able to withstand drought.

Since the loss of organic matter has changed the chemical and physical properties of the soil, it is interesting to observe the influence which its return to the soil has upon the yield of grain and the properties of the soil.

In 1892 a field at the Minnesota Experiment Station that had been cultivated about forty years to small grain, principally wheat, was divided into plots for experimental purposes. A preliminary trial showed that the land was uniform in crop-producing power. On one plot wheat was grown continuously, while on other plots wheat was grown in rotation with corn, clover, and oats. An application of farm manure was made once during the rotation (Minn. Exp. Sta. Bul. No. 53). The clover was sown with the wheat. The land produced one clover crop, two wheat crops, and an oat crop. The organic matter of the soil was increased by the clover crop residue and the manure. The influence of the rotation upon the yields was noticeable, and will be observed from the following table:—

PLOT I.

WHEAT CONTINUOUSLY.				WHEAT IN ROTATION.			
Year.		Yield per Acre.		Year.		Yield in Bushels.	
1893	...	...	12·3	1893	...	...	13·7
1894	...	...	8·9	1894	...	...	Clover.
1895	...	...	17·3	1895	...	...	22·3
1896	...	...	14·1				

In other trials even larger gains have been secured when wheat-cropped soils have been given an opportunity to increase their organic matter. The average of six years' trials at the Minn. Experiment Station show that a gain of 6 bushels per acre can be secured when wheat is grown in a rotation in which clover forms a prominent part. The fact that the yield of wheat can be increased on an old wheat soil by simply a change in the method of culture shows that the soils are not depleted of their mineral fertility.

By many, wheat is considered an exhausting crop, and it is believed that it makes heavy drafts upon the fertility of the soil. The way it is usually cultivated does impair fertility. The experiments that have been made show, however, that it is not the crop itself that is responsible for the loss of nitrogen and the decline in fertility, but it is the method, or, rather, lack of a systematic method, of cropping that has been followed. When wheat is raised in a rotation, it is not a soil-depleting crop, but when raised continuously, large amounts of nitrogen are lost, not through the crop, but by the decomposition of the nitrogenous humus. While many wheat farms of the north-west have lost large amounts of nitrogen, the soils are by no means depleted of their nitrogen. The Rothamsted soil, which has raised over fifty crops of wheat continuously and without fertilisers, contains only about 0·9 per cent. nitrogen; while many of the wheat soils of the north-west, that have produced twenty or more wheat crops, contain 20 per cent. nitrogen. The method of cultivation that is followed does not allow this nitrogen to be properly utilised by the crop.

The use of commercial fertilisers as a means of returning the fertility to the soil has been proposed and tried. The experiments that have been made show that commercial fertilisers cannot be used economically in the production of large areas of wheat in the north-west. The two main difficulties which stand

in the way of their use are cost and weeds. Experiments made by the Minnesota Experiment Station have shown that on old wheat lands the yield per acre, when a complete commercial fertiliser is used, is no greater than when a good system of rotation is followed. Therefore, the only feasible way of making old wheat lands more productive is to rotate the crops, growing some leguminous crop, to use farm manures, and practise more thorough cultivation. On some farms wheat has been raised in a systematic rotation, and farm manure has been liberally and intelligently used. On such farms no decline in yield per acre has been observed. In fact, on some of these farms where wheat has been systematically grown larger yields per acre are secured than when the land was first brought under cultivation. The raising of wheat has been abandoned on some farms where a large amount of farm manure is produced, because its liberal use causes the grain to grow too rank and to lodge.

In some localities millet is grown as a green manurial crop, and then wheat follows the millet. This method has been found to give good yields. The millet increases the stock of organic matter in the soil, but does not increase the nitrogen. There is needed in the north-west some good leguminous crop for green manurial purposes—what the cow pea is to the south and crimson clover to the central northern States. While clover, peas, and vetches are valuable, and thrive fairly well, there are difficulties attending the use of each of these crops for manurial purposes. If some good leguminous crop, suitable for manurial purposes, could be found for the north-west, its use would materially increase the yield of wheat and conserve the fertility of the soil. Such a crop remains to be either found or developed. This is a problem upon which many experiment stations are now working.

The fact that the wheat soils “recuperate” so easily when given the right culture, that the loss of nitrogen can be checked and even increased by a rotation of crops, makes the outlook for wheat production in the United States even better than it has been.

The year 1950 and all subsequent years give promise not of a wheat famine, as Sir Wm. Crooks predicts, but of larger yields and better wheat than are secured at present. This increase, however, depends entirely upon the introduction of more rational methods in wheat farming—that is, the application of the principles and teachings of science to agriculture.

WHEATS SUITABLE FOR QUEENSLAND.

By W. SOUTTER,
Inspector of State Farms.

(Concluded from last month.)

With three exceptions, the wheats contained in this part of the descriptive list are hybrids, and most are the production of Mr. Farrar. Although there is a general resemblance all through, a wide difference in the character of the straw and grain is apparent, also the habit of growth and time of maturing. All are wheats of considerable promise, and likely to become valuable alike to the farmer and the miller.

MENTOR—

Straw, 3 feet; short-jointed, hard at base, tapering, slender, very little flag, not often affected by rust.

Ear, close set, tapering, well filled, terminals weak, chaff white, bald.

Grain, short, thick-set berry, white. Mid season.

T—

Straw, 3 feet 10 inches; long-jointed, tapering, clean, medium hard, no flag.

Ear, open set, well filled, nearly bald, white chaff, small awns on terminals.

Grain, long, and well-filled berry. Early. This wheat is likely to become a favourite.





R-1

8010

V-1

B-4

186 A1 B1

B-Y-1

RERRAF—

Straw, 3 feet ; slender, straight, short-jointed, soft, rather flaggy, liable to rust in moist weather.

Ear, $3\frac{1}{2}$ inches ; open set, well filled, chaff white, slight awns on terminals.

Grain, short, thick berry. Mid season.

FARRAR'S 95 (b)—

Straw, 4 feet ; straight, strong, inclined to coarse, thick at base of ear, dense flag at base of straw ; hitherto no rust has attacked this wheat.

Ear, 5 inches ; medium close set, well filled, bald, bold, fine-looking head, chaff white.

Grain, fine long, well-filled berry. Early.

86Y—

Straw, 3 feet 6 inches ; slender, straight, soft, slight flag, long-jointed, very thin at neck ; no rust so far has affected it.

Ear, $4\frac{1}{2}$ inches ; close set, compact, well filled except at terminals, bald, chaff white.

Grain, round, short, plump. Early.

(b2) RR—

Straw, thick, inclined to be coarse, hard, straight, long-jointed, flag persistent.

Ear, close set, well filled, tapering, bald, chaff white.

Grain, a handsome bold berry. Mid season.

R—

Straw, 3 feet 6 inches ; slender, long-jointed, clean and free from rust and flag, hard and tough.

Ear, 4 inches ; close set, tapering, terminals badly set, chaff inclined to brown, nearly bald.

Grain, long and thin. Early maturing.

86D—

Straw, 3 feet 9 inches ; long straight joints, rather coarse, hard, tapering, flag persistent.

Ear, $4\frac{1}{2}$ inches ; wide set, bright white chaff, well filled except extreme terminals, slightly bearded.

Grain, long, cylindrical. Early maturing. Note—This wheat has greatly improved during the past two years.

V1—

Straw, 3 feet ; short-jointed, straight, slender, slight taper, not much flag.

Ear, 4 inches ; wide set, compact, bald, well filled, white chaff.

Grain, small round. Mid season.

B4—

Straw, 3 feet 10 inches ; joints long, medium hard, straight and strong, but not coarse, tapering, not much flag.

Ear, $4\frac{1}{2}$ inches ; close set, tapering, bald, terminals badly set, chaff red.

Grain, long, thin and hard. Late.

86 A1, B1—

Straw, 4 feet ; long-jointed, straight, slender, slight taper, not much flag, medium hard.

Ear, 4 inches ; wide set, compact, well filled, very prolific, white chaff.

Grain, a fine large berry with thin skin. Early.

BY—

Straw, 3 feet 10 inches ; long-jointed, straight, clean, tapering, hard, free from flag.

Ear, 4 inches ; open set, well filled, terminals not well set, white chaff.

Grain, short and plump. Early.

R1—

Straw, 3 feet 9 inches ; soft, inclined to be coarse, has a lot of flag, short joints at base, was affected with spring rust.

Ear, 4 inches ; open set, yet compact, well filled, white chaff.

Grain, round and plump. Mid season.

85 B2, 86 A1—

Straw, 4 feet ; hard, short-jointed at the base, flag persistent, clear white colour.

Ear, 4 inches ; open set, quite bald, well filled, white chaff.

Grain, long and deep. Mid season.

85 CD1—

Straw, slender, hard, short-jointed, tapering, not much flag, slightly affected with spring rust.

Ear, 4 inches ; very wide set, well filled, white chaff, short awns on terminals.

Grain, round and plump. Early.

14 (cross) COMEBACK F INDIAN—

Straw, 3 feet 9 inches ; long-jointed, soft, pale yellow, tapering, very little flag.

Ear, 4 inches ; close set, terminals not well filled, chaff inclined to brown.

Grain, a fine plump berry. Mid season.

115 (cross) VENESSA—

Straw, 4 feet ; coarse, soft, and flaggy.

Ear, $3\frac{1}{2}$ inches ; square, slightly clubbed, terminal grain small, chaff yellow at base, short awns on terminals.

Grain, short and plump. Mid season.

118 (d) (cross) 14 AND ROMA—

Straw, 3 feet 6 inches ; long-jointed, coarse and soft, much flag at base.

Ear, $4\frac{1}{2}$ inches ; open set, white chaff, slight awns on terminals.

Grain, long thin berry. Late.

49 (c) DQ2—

Straw, short-jointed at base, mid joint long, soft, yellow, tapering at top, slightly flaggy.

Ear, $4\frac{1}{2}$ inches ; open set, well filled, chaff white, slightly brown at base, nearly bald.

Grain, berry long. Late.

8 (e) RR—

Straw, 4 feet ; very coarse and soft, carries a lot of flag, affected slightly with spring rust.

Ear, $4\frac{1}{2}$ inches ; open set, quite bald, well filled, white chaff.

Grain, round and plump. Mid season.

42 (c)—

Straw, slender, long-jointed, hard, tapering, no flag.

Ear, 4 inches ; medium, close set, nearly round, well filled except terminals, white chaff, bald.

Grain, fine oval berry. Mid season.

9 (d) RR STEINWEDEL (cross) TALAVERA—

Straw, slender, long jointed, tapering, soft, very little flag, no rust.

Ear, $3\frac{1}{2}$ inches ; close set, rather uneven, bald, terminals not well filled, chaff white, inclined to brown.

Grain, small square. Early.



R-1

85-B2.66A1. 85.C.D1.

14.(cross)Comeback. 115 (cross) 118d (cross)
& F. Indian. Venessa. 14 & Roma



49(c) D.Q.(2)

8.(e) R.R.

42 (c)

9 (d) R.R. Steinwedel. 57.C.
(cross) Talavera. (f).60.C.
(f).



92.(8)2.

98(cross)
Rerraf.

18(d)B(e)Q.

Blue Stem.
(Shelton).

37(c)M.F.

14(cross)
Roma.

57 C (*f*)—

Straw, 3 feet 6 inches ; dull yellow colour, soft, long-jointed, inclined to be soft and flaggy, slight appearance of spring rust.

Ear, open set, with terminals badly filled, chaff clear white, bald.

Grain, round and plump. Mid season.

60 C (*f*)—

Straw, 3 feet 6 inches ; straight long joints, clear of flag, soft and tough.

Ear, $4\frac{1}{2}$ inches ; wide set, well filled, slight awns on terminals, white chaff.

Grain, round and white. Early.

92 B2—

Straw, long joints, slightly coarse, pale yellow, rather flaggy.

Ear, square at base, close set, slight beard, chaff inclined to red.

Grain, rather thin. Early.

98 (cross) RERRAF—

Straw, 4 feet ; short-jointed at base, hard, clean and white, no rust.

Ear, wide set, open, slight awns on terminals, well filled.

Grain, small but well filled. Early.

18 (*d*) B (*e*) Q—

Straw, 3 feet 9 inches ; slender, long joints, flinty, very little flag.

Ear, $4\frac{1}{2}$ inches ; close set, awns prominent on terminals, white chaff.

Grain, fine bold berry. Mid season.

BLUE STEM (Shelton)—

Straw, very slender and free from rust, silvery, short joints, tapering, no rust.

Ear, 3 inches ; very close set, chaff inclined to brown, slight beard at terminals.

Grain, small but plump. Early.

37 (*c*) M.F.—

Straw, 3 feet 9 inches ; long joints, soft, carries flag to third joint.

Ear, open set, quite bald, clear white chaff.

Grain, round and well filled. Mid season.

14 (cross) ROMA—

Straw, 3 feet 3 inches ; medium coarse, soft, dark yellow, rather flaggy.

Ear, open set, rather flat, terminals not well filled, chaff white, tinted brown, nearly bald.

Grain, short, with square end. Late.

The various wheats illustrated in this and the last number of the *Journal* are all of the natural size.

AGRICULTURAL PROBLEMS OF THE 20TH CENTURY IN THE AUSTRALIAN COMMONWEALTH.

By HENRY A. TARDENT,

Late Manager of the Biggenden Experiment Farm.

To assist on the same day at the birth of a new year, of a new century, and of a new nation is probably unique in the history of mankind. Still such was the privilege of every Australian on the 1st of January last. We may well congratulate ourselves on having the good fortune to live in such eventful times.

Let us hope that the century will be a happy one for humanity at large, and especially for the noble tillers of the soil throughout the world.

As to our young Commonwealth, it gives every promise to develop into one of the greatest, happiest, and most glorious nations ever known to history.

It does not require a great prophet to foretell that agriculture will occupy a prominent place, both in the development of the Commonwealth and in the preoccupations of the incipient century.

In the manufacturing industries, the populous nations of Europe and America will, for many years to come, remain ahead of us; whilst in the primary production of minerals and timber, of wool, meat, hides, sugar, all kinds of agricultural products and fruits, the odds are in our favour. Our vast territories, our unlimited natural resources, our fertile virgin soils, our genial climate as well as the sturdiness of the race, ensure us such advantages that we can safely challenge the world.

The knowledge of those facts ought to guide our activity. In spite of present appearances, humanity is making rapid strides towards a closer brotherhood and more unity. The artificial fiscal barriers now existing between nations are doomed to a gradual decline and total disappearance. The pre-eminence will then belong, not to those nations which will produce indifferently a bit of everything, but to those which will have brought to a high degree of perfection those specialities for which they are best fitted by Nature.

The century just expired has seen wonderful transformations in our methods of farming. The judicious application of science and mechanical appliances to farming has enabled the tiller of the soil to increase manifold his producing capacities, and now populous communities thrive where formerly a single family had difficulty in making a decent living. That movement will grow in intensity throughout the century and produce results undreamed of now by the most sanguine of us.

Many of the drawbacks the agriculturist is now suffering from, such as losses through floods, droughts, frosts, hail, epizootics, &c., will be removed or minimised by scientific discoveries, and by a constantly increasing system of mutual insurances.

To reach those various ends will require the combined efforts of all the good wills, the vital forces and intellects of the nation. Present-day Governments can no longer, as in ancient times, limit their action to simply maintaining order, collecting taxes, and waging wars. By every means in their power, but more especially by an abundant diffusion of science and education, they will awaken the dormant energies, and thus help to develop all the latent resources of the country. They will devise means to preserve our young agriculture from its most destructive enemy—the one which ruined the once flourishing agriculture of the Roman Empire, and that of many other great nations: I mean the clutches of the usurious money-lender. A farmer disabled by age or by accident will also be cared for as are now the defenders of the country. And rightly so; for the man who spends his life in subduing Nature, in fighting droughts, floods, frosts, hails, pests, &c., is a conquering hero on the same footing as the man who fights against the foreign invaders of his native soil.

Governments will also render invaluable services to the production and distribution of wealth and more particularly to all the agricultural industries by the establishment in foreign lands of museums and depôts of our products, and by the appointment in connection therewith of commercial and agricultural agents who will have a double mission. First, they will advertise and make known there their native country and its productions; secondly, they will inquire into and report upon the progress of agricultural and commercial science, exactly as military attachés now watch and report upon military matters.

As to the farmers themselves, they will constantly thirst and strive for more knowledge, and become more and more convinced that private isolated efforts are no longer sufficient to face with success the world's competition. Those efforts must in some way be combined and their results centralised for the attainment of the great object of such combination.

Whether that centralisation be effected by mighty private millionaires, mighty trusts and syndicates, as in America, or by a system of voluntary or compulsory co-operation of the individual units with or without the Government interference, or perhaps by a combination of the different systems, is not for me to say. It is eminently the problem of the century. Its solution will in a great measure depend upon our moral and intellectual development, upon our knowledge of ethics and of the laws of political economy.

Let, then, every Australian, from the statesman to the simple citizen and farmer, make himself acquainted with those problems. Let us study history and political economy, investigate the working of the various systems in other countries so as to avoid the mistakes which have been made, and apply to our circumstances those institutions which have proved a success and stood the test of practical experience.

The fact that we are the last to enter the arena of history imposes great obligations upon us, but it gives us also invaluable privileges.

We have implicit faith in the judgment and sound common sense of our young nation. Her people will find for each problem practical solutions which will reconcile principles now seemingly quite inimical to each other, solutions which will give us the benefit of social co-operation whilst at the same time safeguarding the individual initiative and self-reliance which have been throughout history the main characteristics of all the great races of men.

We must never forget, however, that science and mechanical appliances are of no avail if the people are not endowed at the same time with an indomitable energy and a high moral ideal.

Whatever may be the material strength of a nation or the extent of her territory, she cannot be called great unless she has, in addition, risen high in intellectual and moral pursuits. Tiny Palestine, ancient Greece, modern Switzerland, have done more for the progress of humanity than huge and sleepy China, Turkey, or the ephemeral empire of Tamerlan.

Let us, then, one and all cultivate in ourselves and in our children all the virtues of the true Christian, of the manly and fearless citizen. In doing so we shall not only find satisfactory solutions for problems of our agriculture, but furnish at the same time the best possible materials for the building up of a great nation.

DODDER IN LUCERNE.

Mr. J. Whiteley, Ackworth Farm, Wycarbah, writes:—I notice in the current number of the *Journal* a paragraph dealing with the destruction of dodder in lucerne. Some years ago I was very much troubled with this pest, and it may interest some of your readers to hear how I got rid of it. The patches affected, as soon as discovered, were cut as close to the ground as possible, and every particle of dodder and affected lucerne removed and destroyed by fire. The place was then covered with a heavy mulch (say 4 to 6 inches) of dry grass. This effectually chokes the dodder, but the lucerne will grow through it. When required to be mown, the mulch should be removed to prevent entanglement in the machine. It is not at all necessary to dig out the lucerne plants. As already remarked, my lucerne was badly infested at one time, but by this method I have got rid of it. I have not seen a trace of it for the last four or five years.

JOHNSTONE GRASS.

Mr. W. Soutter, Inspector of State Farms, says:—

Notwithstanding the repeated warnings given both verbally and in print against the danger of spreading the "Johnstone grass," it is a notorious fact that many individuals are still continuing to sow and distribute this grass. In almost every seedsman's catalogue it is advertised as an excellent fodder plant, and is hence bought by the unwary and sown regardless of position. I would again repeat the note of warning—that if Johnstone grass once gets into cultivated lands it is good-bye to any further cultivation. It is next to impossible to plough land that has become infested with it, and any crop that may be put in will be completely smothered up. The Logan farmers can

furnish abundant testimony as to the Johnstone grass pest—it has made sugar-growing very uphill work there. If any would-be growers of Johnstone grass wish to give it a trial, let them sow it in some isolated position, where its spread can be prevented from reaching cultivated lands.

Quite recently the writer was just in time to prevent a farmer from sowing a five-acre block right in the middle of his cultivation. This man had been led to believe that this grass was a desirable one to grow, hence he looked out the best piece of land for the purpose of giving it a good start. There may be many others who, in ignorance, might do the same thing. To them I would say take the advice of one who knows—and don't.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

2ND LESSON.

By A.J.B.

In our last lesson I explained to you the necessity of ploughing and otherwise working the soil, which work is included in the word "cultivation." You know that the farmer is not always ploughing his land. If he were to do nothing else but plough, he would not be able to sow any crops. There are certain times and seasons when ploughing has to be done, and there are seasons when the farmer and his men attend to other work.

You are not too young to understand why some crops grow best during the winter and others during the summer. I will therefore give you a short lesson on what I will call the "seasonable" work on the farm.

There are few Queensland children who do not know what maize is; only they know it by the name of "corn." Well, maize does not like cold weather. On a right frosty morning you like to get near a good fire, or, if you go out, you like to have a warm coat on. But a maize plant or a sugar-cane plant has no warm coat to protect it from the cold, so, if either of them happen to have been planted at a wrong season, its tender green leaves exposed to the frosty air of night become frost-bitten, and the whole plant dries up when the hot sun shines on it, and it withers away. Then, such plants as cauliflowers and cabbages love the cold weather, and if they are planted out of their season—that is, if they are exposed to the blazing heat of our summer—they will not thrive, and the greatest care has to be taken to make them grow at all. Then, again, the climate of Queensland changes. If you live away in the far North—at Cairns, Cooktown, or Thursday Island—you find that the weather is very hot almost all the year round; so it is on the coasts of the Gulf of Carpentaria, which you see on your map. But up on the country above the Main Range it is very cold in winter, even at Herberton in the North. So you see that all over Queensland the farmers have to remember the climate they live in, and so arrange the time for ploughing and sowing. On the Darling Downs they begin sowing the wheat in April—that is, in autumn. Then the wheat, which loves the cool weather, comes up, and if it gets sufficient rain at the proper time the farmer will expect a good crop, unless something happens which you will hear about in a future lesson.

The maize crop, on the contrary, loves the hot weather, so the farmers plough their corn land in July and August—that is, in the winter—and, as soon as there is no more fear of frost, they sow the maize, and soon the fields are covered with the beautiful dark-green maize plants, which produce their golden cobs in the height of summer.

Now, here is an easy lesson for you to learn. Remember that all the common vegetables—such as cabbages, cauliflowers, carrots, turnips, and many European vegetables—are best grown during the cold winter weather; and that sugar-cane, rice, yams, maize, melons, pumpkins, and other, what are called tropical, plants must be grown during the hot months of summer.

I told you that the farmer is not always busy ploughing the land. When his crops are sown, he has to keep the weeds down for the reasons I gave you in your first lesson. So he stops ploughing and cultivates the soil among his growing crops in order to supply them with plenty of plant food.

Then by and by his time is occupied with gathering in the harvest. In November he is busy harvesting his wheat and barley crops. In December and right up to April and May, he pulls his corn. Then he has to dig his potatoes twice in a year, besides gathering vegetables. And again he has fields of lucerne to cut and turn into hay. And so, all the year round, each season brings its round of duties, and the farmer who does not watch the seasons, and who does not plough, sow, and plant at the proper time, will lose a great deal of time and money.

Now, having explained to you the necessity for watching the seasons, you can easily understand how a farmer may lose a great deal by ploughing and sowing too late. If he puts in a crop in June which should have been sown in April, he is a bad farmer, and almost deserves to lose his time and reap a bad crop. And if he is in too great a hurry and hopes to get his crop out before his neighbour, and so plants in April instead of in August, he is just as bad a farmer and can blame nobody but himself for his want of success.

Before we finish this lesson, I must tell you that all soils, although close to each other, are not alike. I may have a farm of which the soil is rich, and deep, and warm, and sheltered from cold and violent winds. My neighbour's farm has a stiff, cold soil exposed to the strong winds. If my neighbour and I were to cultivate our farms in exactly the same way, one of us would be doing wrong, and would suffer for our want of knowledge. If his farm is wet and cold, he must do something to the soil to get rid of the wet, and to warm it. If mine is too dry and too light, I must do something to retain the moisture and to make the land less loose and porous. So you see that every farmer has to learn what to do to his land so that it may yield him good crops.

Here are eleven more questions, the answers to which you can supply from what I have just told you.

Questions on Lesson 2.

1. Why does the farmer not spend all his time in ploughing the land?
2. Name the seasons.
3. What is meant by seasonable work?
4. Name any plants which thrive best in hot weather?
5. Name some that grow best in winter?
6. Name the warm and cool portions of the colony?
7. In what months does the farmer plant sugar-cane, sow rice, maize, wheat barley, and kitchen vegetables?
8. When does he begin to harvest maize and wheat?
9. Why should the farmer watch the seasons?
10. Is the soil on all farms of the same quality?
11. Describe two different kinds of soil?

3RD LESSON.

In the last lesson you were told something about the soil. We will continue that subject and find out what soils are made up of. If you go into the country and look round you, you will notice that in some places the soil is black, in others it is red; further on you find brown or chocolate-coloured soil; on the open hillsides you will often observe stony, gravelly soil; and, lastly, you will meet with soils which contain a good deal of sand (this is called a sandy loam), or others, again, which are composed entirely of pure sand. It is too soon to explain to you what it is that gives the various colours to all these soils. That you will learn when you are more advanced in the subject. Now, if a farmer were looking for a good piece of land which will yield him good crops, he would not be content with merely looking at the surface. You have already seen that the roots of many farm crops run deeply into the

ground, so the farmer wants to know what sort of soil there is beneath the surface. To find this out he must dig down into it for at least 2 feet. The surface may be composed of rich soil, but just below it there may be very bad soil, which would prevent the land from yielding heavy crops.

A rich soil, you told me the other day, is such as is found in scrubs and on the black and red soil plains of the Darling Downs. What is it that makes scrub soils, as a rule, so rich and fertile? If you were to examine scrub soil by the help of a microscope, you would find that it is principally made up of decomposed (that is rotten) leaves, sticks, and trees, which have fallen to the ground during a number of years, probably for many hundreds of years. Mixed with this rotted matter called "humus," there is a quantity of lime. This lime is derived from countless thousands of snail shells, which you can find in most scrubs. If you have ever seen the great mounds heaped up by the scrub turkeys, you must have noticed the ground surrounding them strewn with these shells. The mother turkey has gathered them day after day to feed her little chickens until they are able to run about and hunt for their own food. At a future time you will learn that lime is very valuable to the farmer. Then, in addition to the humus and the lime, there is a certain quantity of fine sand and slime washed on to the land during floods. These scrub soils are often of great depth, and the deeper a soil is the better it is able to supply plant food to the crops.

The great black and red soil plains are not formed in the same manner. Most of them are what is called volcanic soils. Their great fertility is not derived from decomposed vegetable substances, but from decomposed mineral matter. This also will form a subject for future lessons.

The soil which lies below the surface is often very different to that on the surface. It is called the "subsoil" from a Latin word which means "under." So remember that the soil immediately below the surface is called the *subsoil*. This subsoil consists sometimes of stiff clay, sometimes of gravel, and in very rich lands is as good as the surface soil when it is turned up by the plough and allowed to sweeten in the air. Well, the farmer who is looking for good land will first of all examine the surface, and will then look below it to see what the subsoil is like. Perhaps he finds a stiff clay close to the surface. This he passes by, because a shallow soil, no matter how rich it is, resting on stiff clay will not yield good crops without a great deal of labour. When heavy rains come, the water sinks through the shallow upper soil, but it cannot sink through the clay, so, if the land is at all flat, the water lies upon the clay, and when the roots of the plant pass into it they begin to turn sickly, and if the root is sick the whole plant suffers and at last dies. Just think how you would feel if you had to sit all day with your feet on a cold wet floor. You would soon become ill, and if something were not done to dry and warm the floor, you would die. So it is with the plant. If its roots are resting on a cold, wet, sour, clay subsoil, it soon turns yellow and dies. But clay soils can be cultivated and made to yield large crops, especially of turnips. The work of making such soils fertile is, however, very expensive, and only farmers with plenty of money can afford to cultivate them. You will learn as we go along how these soils are treated. Now, I am not going to tell you at this stage all about subsoils, because it is a very difficult subject, and there is no need for you to know much about it at present. All you need learn now is that a good farmer will always try and find out what lies below the surface, and by knowing that, amongst other things, he knows whether the land he is examining will be suitable for growing good crops or not.

You have seen farms which are perfectly flat, and others which lie on a hillside. Land which is flat is exposed to the sun all day long, and it is also exposed to every wind that blows. But land on hillsides running north and south can only receive the sun's rays either in the early morning and during a great part of the day, or else it does not receive the morning sun until late, owing to the height of the hills towards the east in which direction the sun rises.

On the other hand it has the benefit of the evening sun. The position of the land with regard to the sun is called its "aspect." If it faces the rising sun, it is said to have an easterly aspect, and if it faces the setting sun, the aspect is called westerly.

The aspect of a farm is a very important matter. In cold countries like Scotland and Denmark and North America, farmers always try to avoid a northern or a north-western (sometimes a north-eastern) aspect. The reason for this is that the cold cutting winds from those directions cause injury to the crops. The soil remains cold and wet until far into the spring, when the farmers should be sowing his crops, and the cold winter sets in earlier than it does in more sheltered localities. You will easily understand how this comes about. When a strong, cold, westerly wind is blowing, place yourself on that side of the house facing the wind. You soon begin to feel cold. Now go to the opposite side of the house. Here you are sheltered from the cutting wind and you do not suffer from the cold. Now imagine the house to be a range of hills. The hillsides facing the west are exposed to the full force of the cold wind, whilst the opposite slope is entirely sheltered. From this you can at once see that a farm on the western side in this State must be much colder than one on the eastern side in the winter time, and that consequently the planting season will be later, and the hot weather of shorter duration on the western than on the eastern slopes. There is one more little thing I may mention to you in connection with aspect. The rays of the morning sun are more beneficial to plant growth than those of the setting sun, and in case I may forget to tell you later on, it is always well in sowing a crop of corn or potatoes, or in planting any crop in rows, to arrange the rows so that the rays of the morning sun may pass along them. Such an arrangement has been found to result in better crops than if the rows cross the sun's rays. Why this is so is not for us to consider here.

Now, we will close this lesson, and I will, as before, give you some questions to answer.

Questions on Lesson 3.

1. Of what materials is a rich scrub soil composed?
2. What is meant by a sandy loam?
3. Why should a farmer want to know the kind of soil beneath the surface?
4. What is a "subsoil"? Why is it called a subsoil?
5. Of what does a subsoil usually consist?
6. Why is clay subsoil bad for field plants?
7. Can land with a clay subsoil be cultivated?
8. What is meant by the aspect of land?
9. What aspect is the best with respect to crops?
10. Why is this so?

CHAMBER OF AGRICULTURAL INDUSTRY.

A resolution was published in the pages of this *Journal*, Vol. VII., p. 309, passed by the Logan Farming and Industrial Association, dealing with the above object. Since then, in response to the circular issued by that association, numerous replies have been received from upwards of forty-six associations and societies in various portions of this State in sympathy more or less with the movement. The last one received was from the Doolbi Mill Branch of the Isis Agricultural Association heartily sympathising with the Logan association in their efforts, and also stating that their delegates to the next agricultural conference will be prepared to urge and discuss the same.

We are informed by Mr. F. W. Peek, who is the original mover of the motion dealing with the question, that he will submit a paper to be read and discussed at next conference, together with a draft copy of rules for the

successful working and carrying out of the objects of the proposed chamber in conjunction with the Department of Agriculture, something on the lines of the scheme now being initiated in New South Wales, but to be made more applicable to the requirements of this State. The principal objects aimed at are to protect the rights and privileges of the associated bodies, to assist, protect, and safeguard the various industries, to take action in regard to any subject or to any legislation affecting their interests, to insure uniformity of rules and other matters of mutual interest.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1901.

The Principal, Mr. John Mahon, reports as follows :—

Farm.

The following were the principal operations on the farm during the month :—Thirty acres were cross-ploughed for lucerne, and 8 acres ploughed for artificial grasses. The land was prepared, and 26 acres sown with lucerne and wheat. An acre of land has been heavily treated with stable manure preparatory to planting with Swede turnips. A large quantity of panicum hay has been made, the wet weather during the month entailing a large amount of trouble in this operation. Eleven tons of first-class chaff were forwarded to Brisbane, selling there at the rate of £4 per ton. The wet weather having induced the growth of weeds, a great deal of work has been necessary in the way of scuffling, hoeing, and otherwise keeping them in check. The usual routine work has been carried out, including cartage of material, &c., from Gatton, haulage of firewood, &c. Some work has also been done in connection with clearing the grounds and paddocks, a quantity of unsightly timber having been removed and burnt. The rainfall for the month amounted to 6·74 inches for ten days. The principal falls were on the following dates : 6th, (·96), 10th (·56), 17th (·80), 19th (·51), 20th (2·84), 21st (·85). The crops are now promising well, and a supply of grass for the winter is assured.

Dairy.

The number of cows in milk during the month was 57 head, and the milk yield totalled 3,277 gallons. Of this, 1,897 gallons were converted into 770 lb. of butter ; 582 gallons gave a return of 632 lb. of cheese ; 430 gallons were supplied to the dining-hall ; 120 gallons were used for domestic purposes ; 248 gallons were fed to calves. The daily average per cow was 19 lb. of milk.

The increase during the month comprised the following :—Ayrshire-Holstein cross, 1 male ; Jersey, 1 female. One yearling Shorthorn was killed by Veterinary Surgeon Quinnell for purposes of practical demonstration to students ; 1 Shorthorn heifer died. The milking cows were, during the period under review, fed on natural pasturage only.

Pigs.

Pure Berkshires : Increase for month, 6 boars, 10 gilts ; sold for breeding purposes, 5 boars, 16 gilts ; sold as baconers, 4 culled breeding sows ; 1 weaner gilt was killed by a horse, and 1 was destroyed (a waster).

Mid. Yorks : Increase for month, 2 boars, 7 gilts ; sales, 5 gilts.

Tamworths : Sales, 2 gilts.

Berkshire grade : We sold as baconers 4 head, including 3 culled sows ; killed for use of dining-hall, 2 porkers.

Large Yorks-Mid. Yorks : Increase for month, 3 head.

Large Yorks-Berks : Increase for month, 10 head.



HILLING UP POTATOES AT LADBURY.



A SUGAR CANE FIELD, AND THE SECRETARY PLOUGH AT WORK ON
MR. MAYER'S FARM, CAIRNS.

Garden.

The following seeds were sown during the month:—Peas, beans, turnips, radishes, lettuces, cabbages (eleven varieties), cauliflowers (three varieties). The young vegetables were cultivated. The orchard and vineyard were harrowed and hoed. The unoccupied land belonging to the garden area was ploughed and harrowed. Headlands were mown and the place cleaned up generally.

Top Garden and Grounds.—The fallen timber on grounds and around buildings was cut up and burnt; grass mown, and flower-beds attended to.

Mechanical Department.

During the month the fence round the Principal's house has been completed, and all the gates hung. The steam chaff-cutter-and-bagger has been thoroughly overhauled and put in good working order. One of the classrooms is being fitted up with stands and shelves with the intention of using it as a museum. A good deal of work has been done in the way of painting and repairing agricultural machinery. It has been an exceptionally heavy month as regards work in the blacksmith's shop, for, in addition to the usual work of horseshoeing and repairs to machinery, several heavy wheels have been tyred. This has been something new for the students, as the tyreing has hitherto been done outside the College by private firms.

POTATO CULTIVATION.

The potato fields will now present a sight to gladden the heart of the careful farmer. Potatoes planted in March have at last had the advantage of good rains, and should be hilled up by this time and give promise of an abundant crop wherever the dreaded scab has not put in an appearance. If they have been properly earthed up for the second time the furrows are left pretty deep and serve as surface drains in case of heavy rain. The soil above, around, and under them cannot be too loose and friable. During the past month weeds will have rapidly grown in consequence of the genial showers and abnormal heat of the atmosphere, but by careful hilling the greater part of these will have been destroyed and will be no detriment to the crop.

THE SECRETARY PLOUGH.

The Secretary Plough here illustrated is employed on the farm of Mr. G. R. Mayer, of Cairns, one of whose sugar-cane fields is also depicted. Mr. Mayer is very much pleased with the work done by this implement which he describes thus: Strictly speaking the plough has neither mould board nor coulter, the large disc doing duty for both.

Four light draught horses are generally used, but it is quite easily drawn by three medium draughts. Of course much depends upon the depth and width of furrows, consistency of soil, &c. Mr. Mayer has been working it at the full depth of from 10 to 12 inches on land that has been previously broken up to a depth of from 5 to 6 inches. It would seem, however, that for the work it is easier on the horses than with most ploughs.

One acre is about the average. A small area compared with that turned over in the cooler districts; but a horse, more especially a heavy draught, will not perform the same amount of work in the Cairns district as in the Southern portion of the State, owing to the climate. In fact there are times, on hot days, when it is almost impossible to work a horse at all.

This plough has a rear wheel attachment; also a 2-inch subsoiler, which can be used when desired. It has been found that by removing the rear wheel and using the subsoiler the draught is lighter than by using the rear wheel alone.

Mr. Mayer is now breaking up land with it, with the same draught, but at a lesser depth; more power would break up to a greater depth as satisfactorily. Breaking up is generally done locally at the lesser depth, however, the full depth being taken at subsequent ploughings. In either case the plough would seem to have an advantage in avoiding, because of the revolving disc, any jar to horses or implement, should an obstruction be met with. Mr. Mayer is so pleased with the class of work done by this plough that he has ordered another.

WHEAT-GROWING IN AUSTRALIA.

The following excellent article on "Wheat-growing in Australia," which was specially written by "Mentmore" for the *Farmer and Grazier*, Sydney, will, we make no doubt, be read with much interest by all engaged in the wheat-growing and milling industries:—

HOW TO GROW AND HARVEST CROPS.

DEVELOPMENT OF THE INDUSTRY.

Wheat-growing is under cloud for the present, not only in this country, but the whole world over; yet, despite pessimists and dry seasons, there is no doubt that, so far as the Commonwealth of Australia is concerned, the industry has a great future in store, and one that will exercise great influence on the general prosperity of the people of this southern land. The expansion of the industry throughout the various States of Australia has been gradual; it is on the up grade, particularly in New South Wales and Queensland, and where the wheat-grower has got a footing he is likely to hold his own against all competitors. The harvest returns for 1900-01 show the present condition of the industry. In Victoria the total area cut for grain last season was estimated by the Government Statist at 2,025,000 acres, yielding, on the average, 9·31 bushels per acre, or an aggregate yield of 18,870,000 bushels. In New South Wales the Government Statistician, for the same year, puts the total area cut for wheat at 1,357,643 acres, with an average yield of 12·6 bushels, totalling 17,195,000 bushels. An unusually large area was cut for hay last harvest in New South Wales, otherwise the mother colony would have, at least, equalled the Victorian aggregate, and perhaps exceeded it. In South Australia, the average yield from 1,600,000 acres last harvest was estimated at 8·15 bushels, making a total of 13,200,000 bushels.

All these States have this season a large surplus for export, and the Queensland returns show that that colony is now also almost self-sustaining in respect to wheat. In the near future the Queensland exports in wheat are expected to take a leading position, owing to the vast area of rich agriculture land now under grazing leases, which will shortly become available for selection and settlement.

New South Wales has a large quantity of good farming land which is now reverting to the Government, and the development of wheat-growing in this State is, therefore, pretty certain to be enormous during the next two or three years. Upwards of 5,000,000 acres in the central district of New South Wales will be available for agricultural settlement during the present year, and the greater part of this area is considered well adapted for agricultural purposes.

South Australia has also a large territory under grazing licenses suitable for wheat, but Victoria's wheat lands are fully occupied, and no further development can be expected in this quarter. At the same time, the possibilities for development in the leading States of the Commonwealth are very great, and the wheat-growing industry is bound to expand by leaps and bounds for many years to come.

TWENTY YEARS' PROGRESS.

An interesting return, showing the production of wheat and the net export or import of breadstuff in the States forming the Australian Commonwealth during the last twenty years was recently furnished to the New South

Wales Legislative Assembly. From this it appears that in 1881 the production of wheat was 28,730,381 bushels. In 1886 the production fell to 20,165,988 bushels, and in this year 603,532 bushels were imported. It rose again in the two following years, but decreased in 1889 to 19,757,509 bushels, and this year 2,107,136 bushels were imported. No further importations were made until 1896 and 1897. In these years the respective productions measured 19,557,726 bushels and 3,641,306. In 1899 the production was 41,417,853 bushels, the largest during the period under review, and the export 11,581,198. The most exported was in 1884, when 17,130,843 bushels were sent out of the colonies, the production being 35,714,456 bushels. The total quantity exported during the twenty years was 127,053,804 bushels. During the period the yields have varied greatly, and so have the prices, and the latter are now so low that the novice in growing wheat is in danger of losing both his time and his money. From a wide experience of the farming methods of this country I venture to offer the following hints on the subject of growing and harvesting wheat crops profitably to readers of the *Farmer and Grazier*:—

CROPS THAT PAY.

The line of demarcation which separates the profitable wheat crop from the unprofitable cannot be drawn on paper or set down in figures. Circumstances and conditions vary so greatly that there is no fixed standard to go by in the matter of expense and labour required to produce a full average crop. A statement may be made—and it has been often done—showing the cost of ploughing, seeding, and harvesting, but that account, as a rule, only applies to one particular locality, and very often to an individual farm. Go where we will, there is always some variation to be found in the expenses incurred and profits to be gained from wheat-growing. Still, there are one or two points in connection with the business worth noting that are very striking and of vital importance to growers. There is no season but what some misfortune or other happens to somebody's crops by storm or pest visitation, but such things are to be expected, and do not count for more than general emergencies. Suppose, however, we take a survey of all the wheatfields in Australia, just on the verge of maturity. It will be seen that a considerable number are likely to yield three or four bags to the acre, while a large proportion will only yield two bags, and a great many, if they are reaped at all, will not return more than the seed.

CROPS THAT DON'T PAY.

Now, anyone who travels about the country can see at a glance, even from the window of the railway train, that there are other causes than the drought responsible for the variation in the quality of the crops he passes by. The land seems all the same, or nearly so, for miles and miles, and yet, what a difference is present in the appearance of the farms. Side by side, separated only perhaps by a wire fence, a wheatfield will be seen that will yield probably three bags to the acre, while its neighbour will only give one bag, and sometimes less. What is the reason for this? Well, it is the difference between good and bad cultivation, or probably proper and improper seeding. The farmers who grow the heavy and profitable crops have worked their ground faithfully—they ploughed it deep and thoroughly, and did not depend altogether on Providence, as their neighbours did. Crops put in on the cheap-and-easy-system of merely scratching the surface are soon spotted when a dry spell occurs. The farmers who work their ground well and faithfully have seldom any reason to complain of their wheat yields if they drill the seed in at the right time. The pioneers of the new wheat lands should be warned against slipshod practices, and must take the consequences if they attempt to raise crops without the necessary labour and skilful working of the soil.

EXPLODED METHODS.

Before success in wheat-growing is possible, the primitive style of agriculture so widely followed must give way to a better system. With a rich soil to go upon, agriculturists in the early days of settlement were so successful as

cereal-growers that a careless and slovenly system was in many cases successfully followed, and it prevails to a great extent to-day. It did not seem to matter much whether the soil was ploughed or only scarified, payable yields were obtained, and the owner of the land was inclined to favour the practice which involved the least labour. Again, having a large area under crop was considered of far greater importance than the proper preparation of a seed bed, and this idea is still active in the minds of many cultivators. An improvement in the average yields rests entirely in the farmer's own hands, and should take the form of cropping smaller areas, better cultivation, the judicious use of manures, and the rotation of crops in conjunction with stock-keeping. The land, generally speaking, has been so productive in the past that men have come to consider the most careless methods of cultivation as being all that is necessary to ensure good crops. When wheat was a different price to what it is to-day there was no incentive to that exertion which leads to and maintains improvement under difficult circumstances. Yet, because excellent returns have been obtained in the past under conditions which could scarcely have justified the expectation, that is no reason why payable crops should be obtained in future under the same régime. The days of primitive farming ought now to have ceased, and that they have not must surely be owing to farmers not having realised the enormous losses they individually, and the country as a whole, have suffered through blind persistence in exploded methods of cultivation.

IMPORTANT POINTS TO REMEMBER.

In wheat-growing a supply of nitrates in the soil is indispensable; but nitrogenous manures are expensive, and accordingly it becomes desirable to govern the processes of cultivation as far as practicable, in order to favour the accumulation of natural nitrates. With the temperatures of Australia, if moisture were present, nitrification would proceed practically all the year through in well cultivated or aerated soils. Unfortunately, the soil is liable to become deficient in moisture, and we cannot hope to maintain a sufficient humidity throughout the year. But farmers could at least have their fallows lifted earlier in the rainy season to secure aeration, and to lead to the percolation of water in the soil, so that by judicious surface cultivation the presence of moisture might be prolonged well into summer, or even throughout the year. To delay fallowing until late in winter or early spring is a grave mistake.

The question of artificial manuring has also to be borne in mind and considered with regard to the climate, and the application of phosphates to the soils deficient in it is particularly to be recommended. Phosphatic manuring, as has been proved, is a means of enabling the wheat plant better to withstand conditions of drought, and this fact is pregnant with importance in respect to wheat-growing in the Australian climate, which again necessitates that in the selection of varieties of wheat farmers should favour spring rather than winter wheats. Australian climatic conditions require that farmers look more carefully to their practice in relation to nitrification; to use phosphatic manures; to select the earlier class of wheats and to favour those which are least liable to rust.

DEEP V. SHALLOW CULTIVATION.

The question of how deep the land should be ploughed is often discussed by wheat-growers. In my experience shallow ploughing is frequently responsible for the very light crops we see reaped on many farms. When the ground is tilled or "broken up" to a considerable depth, it absorbs and retains a great deal more moisture than shallow cultivated ground. This is a most important fact to remember. Besides, deep ploughing affords more space for the roots of plants, produces many of the beneficial effects of draining, preserves from the evil consequences of both drought and rain, and produces much heavier crops than can be raised by shallow cultivation. Where shallow ploughing has been practised, the deepening of the soil should be gradually accomplished. By going down an inch lower each time only a little of the hungry subsoil is brought to the top. It is not good husbandry to have much of the subsoil turned up at any

one time. We know by experience that fairly good crops may sometimes be grown with very superficial tillage, as by merely scarifying and harrowing the surface; but if large yields are to be made the rule instead of the exception, it is the work of years to deepen, enrich, and prepare the soil that it can be accomplished. The importance of having a deep mellow soil cannot be overrated. It is a pleasure to gaze at the luxuriant crop growing in it, a pleasure to harvest the abundant product it yields, and a pleasure to count the gains derived from it. The idea that the wheat crop requires a shallow furrow may be true enough in some countries, but it is fallacious with respect to wheat-growing in most parts of Australia.

LARGE AREAS A MISTAKE.

In this country it is hardly possible to be too thorough in the work of cultivation. The success of the crop depends largely upon the condition into which the soil is brought at the commencement of the preparations for seeding the land. Many farmers, it has often been observed, obtain poor returns by endeavouring to cultivate too large an area. By reducing the area one-half, and giving proper attention to the preparation of the land, the average wheat yields per acre throughout Australia would be almost doubled, and the expenses in connection with the crop very greatly reduced. Now, that is a statement to ponder over. Only half the seed would be necessary, and the cost of harvesting the smaller area would be considerably less, while the balance of the land would be resting and recuperating. The desire to get in large areas of wheat regardless of how the land is prepared is a system of farming that will, sooner or later, have to be abandoned. When wheat was a high price a very few bushels per acre sufficed to reward the grower for his labour, but only the heavy crops are profitable when wheat is low in price, and those who do not lay themselves out to produce such run a great risk of losing money in the business.

MANURING THE WHEAT CROP.

In the whole range of agriculture there is no subject deserving of closer study and investigation at the present time than the use of artificial manures in connection with wheat-growing. On the newer occupied wheat areas of this State the virgin soil is generally so fertile that no manuring is required, but where cultivation and cropping have been practised for a considerable number of years the fertility has been pretty well exhausted, and on such lands it is impossible to grow profitable crops without a stimulant of some kind. As different doctors prescribe different treatment to the sick patient, farmers are also found to differ in their methods of recuperating wheat sick-soils. The orthodox custom in the older farming regions is to combine stock-keeping with cereal-growing, while in others a systematic rotation of cropping is adopted. Neither of these two systems is always possible or convenient to the pioneer wheat-grower of this country. The lack of means compels him to creep before he walks, and years of hard toil lie before him ere he develops into a full-fledged agriculturist, with sufficient capital to enable him to engage in the other branches of farming. For a time wheat-growing, and that alone, occupies his attention, and how to raise the crop successfully and with profit is the problem he has to solve; and, with the present low prices for grain, and a gradually-decreasing fertility of his farm, from continual cropping, this is not a very easy thing to do. The productive capacity of the wheat lands of this State is limited to an average of 10 or 12 bushels—sometimes more, and sometimes less, according to the season—and this return does not leave a great margin to work upon in the way of manuring after the necessary expenses of cultivation are deducted.

ARTIFICIAL FERTILISERS.

There is plenty of evidence available to prove that artificial fertilisers can be profitably applied to the wheat crop or worn-out lands, but, on the other hand, many farmers who have tried them complain of the cost being greater than the value or increase in the yield; and some have found them to fail altogether. In these instances, however, where the results were unsatisfactory,

the quality of the manure used may have been to blame, and the nature of the season may also have had some influence. In a year of limited rainfall the benefit of certain fertilisers will scarcely be apparent on the first crop, and farmers have, therefore, to be careful in forming conclusions about any particular manure.

It requires a certain amount of moisture to render some manures soluble, and a shower, or its absence, at the right time may make a vast difference in the quantity and quality of the crops produced. In the dry districts, it has been demonstrated that the most quickly-acting, and generally the most profitable, manure to apply to wheat crops is soluble phosphoric acid, in the form of superphosphate, and farmers would do well if they used this fertiliser almost exclusively. A supply of nitrogen is also necessary on certain soils, but, generally speaking, there is naturally sufficient of this element present. From experiments recently carried out by Mr. Pearson, the Government Agricultural Chemist in Victoria, it appears to be a mistake to use nitrogenous manure, such as nitrate of soda and sulphate of ammonia, in conjunction with superphosphate. The same authority asserts that where farmers have failed to appreciate artificial manuring of wheat crops they made the mistake of applying it in far too large doses. "The farmers," he says, "complained that the manure burned the crops up." Mr. Pearson explains that this condition of the crops had been brought about simply by the plants growing too vigorously at the start and using up all the moisture available in the soil. The remedy was to use less stimulating manure, and in smaller quantity, for immediate and satisfactory results. He advises wheat-growers to use concentrated superphosphate, at the rate of from 20 lb. to 30 lb. per acre, and it will generally double the yield and return a handsome profit. In South Australia, Professor Lowrie, of the Roseworthy Agricultural College, also strongly advocates phosphatic manuring for wheat crops, and contends that this substance is a means of greatly reducing the conditions of drought. In the neighbouring States the use of artificial manures by wheat-growers has increased enormously during the last year or two. Nearly every farmer now uses the seed-drill, sowing the manure at the same time.

THE BARE-FALLOWING QUESTION.

Although it must be admitted that bare-fallowing, if done in the proper manner, will go a long way towards ensuring good and clean crops of wheat, the experience of those who have tried green manuring tends to show that it is a better and more economical means of utilising and recuperating the soil than the former method. No doubt, in the dry districts, a well-worked bare fallow is of great importance in regions where a wet season is the exception, not the rule. But the drawback to the system is that, while it involves a large amount of labour if properly done—and it is useless if not—it does not increase the fertility of the soil beyond that given by the moisture which has been absorbed. A bare fallow requires quite as much working as land that is about to be cropped, but nothing is obtained from it towards the expenses of the farm until the following year; thus, two seasons are required to produce one crop.

I differ from a large majority of farmers on this subject, and claim that summer fallowing, as generally practised, is not a benefit to the soil. It will give more bushels per acre for a few years, but in a short time the soil will fail to respond to the treatment. A large percentage of farmers have an idea that soil, if summer fallowed every few years, can never be exhausted. This is a fallacy which ought to be corrected, and the sooner the better; for it could be said with equal propriety that a lake would never become dry were its waters continuously drawn out, there being no stream or spring to replace that which was removed. Every crop that is harvested has taken a portion of the fertility from the land, and to keep this up something must be returned. Summer fallowing is similar to using the poker to make the fire burn. The more it is poked the sooner will the fuel be exhausted, but nothing is added to the fire.

RAPE V. BARE FALLOW.

It has to be remembered that two years' labour and taxes have to be charged against the crop produced on fallowed land, and when wheat is at a low price the expense is oftener greater than the profit. On the other hand, by a different system, as, for example, where sheep can be kept, and the land rested for, perhaps, three consecutive seasons, two crops can be taken subsequently in succession - and no fallowing is necessary. After the last crop is taken the ground clothes itself naturally with herbage, which will afford a large quantity of food for sheep. This is, doubtless, a much cheaper plan of working, and is not so exhaustive on the soil. But it is not well to allow the sheep to depend altogether on the self-sown feed that springs up. This can only be done where there is a large area of land at command. Small farmers, however, can largely supplement the natural herbage by scattering a few pounds of rape seed on the stubble in the early autumn. A light harrowing is all the cultivation it requires if rain falls opportunely, and the rape will provide a really great amount of excellent food for the stock during the spring. About 4 lb. of seed is sufficient for an acre, and it will fatten six or eight sheep per acre, and give the land a good manuring at a cost of about 1s. per acre. A green crop thus grown and consumed on the land is more enriching to the soil than five years of bare fallow. The deep tap-roots of the rape plant bring to the surface valuable elements from below, and render them available for succeeding cereal crops. In all soils where there is a deficiency of vegetable matter, the mould produced from the decayed roots of the rape is exactly what these soils require to unlock their fertility; hence the farmer who works upon this system not only makes money out of his fat sheep, but enriches and improves his land at the same time.

BROADCASTING V. DRILLING.

The practice of sowing grain crops broadcast is still the general rule on the majority of farms in Australia. At the same time there is a growing tendency in favour of the seed drill, and quite a number of our best farmers would now never think of putting in their crops in the old style. The drilling of the seed has many advantages to recommend it. In the first place, nearly a third of seed can be saved, and this of itself very soon pays for the machine. Again the seed, being more evenly deposited in the ground, it comes up more evenly, and produces a more equal crop. This is of considerable advantage, because many otherwise good samples are destroyed by the presence of unripe grains, which is almost certain to be the case where the seed is sown broadcast. The grains which fall deep in between the ridges and furrows, if not lost altogether, cannot possibly be upon the surface as soon as those near the top; and so, late in starting, their growth is retarded all along by the stronger and earlier stems, which have the effect of choking the later ones. Moreover, it is estimated that fully a quarter of a bushel of seed per acre can be saved by the use of the drill, compared with sowing by hand. Assuming that a farmer has 300 acres to sow, he can save at least 1s. worth of seed on every bushel he sows. At the present price of wheat, this will soon pay for a new seed drill. Besides this saving, however, the machine is good for many seasons to come, and will repay itself ten times over by the annual saving effected in seed alone. Moreover, when the seed is broadcasted, the ground requires to be twice harrowed afterwards; whereas, if put in with the drill, one harrowing is sufficient. Another advantage of the drill is that manure can be sown at the same time as the seed, if necessary, and, when all these points are considered, the practice of drilling *versus* broadcasting appears to have much to recommend it.

CLEAN WHEAT CROPS.

One of the chief causes of failure in the wheat crops of this country is weeds. The worst weed the wheat-growers of Australia have to contend with is the "wild oat." This pest is not easily got rid of once it is introduced on to a farm. I lately interviewed a wheat-grower, however, who showed me how to successfully cope with the wild oat, and other weeds also, which are detrimental

to the main crop. His plan is to procure every year, or as often as required, a few bushels of as clean seed as he can buy from a different locality to his own, which he sows on a selected number of acres. When this plot comes up he tends it carefully, going through it two or three times—it does not take long altogether—and pulling by hand every weed in the crop. With an average yield of four bags to the acre from, say, 10 acres, he gets as much seed as he requires, free of wild oats, for sowing the rest of his crop. He takes care never to sow any weed seeds, and, by the means described, what was once a very dirty farm has been cleaned of weeds almost entirely, especially the wild oat. In course of time this weed will be eradicated on the farm referred to, and at no great cost either.

It only involves a little trouble in procuring tolerably clean seed to commence with, and a few days' labour subsequently in pulling out any weeds that happen to appear in the crop. Yet, the majority of farmers do not go to this small expense, and they, consequently, have to complain of weedy crops. Farmers in new regions should emulate this good example before the wild oat gets a firm hold on their land. The extra quality of the wheat, independently of the greater number of bushels grown, will repay the trouble and expense incurred each year ten times over.

REAPING MACHINES.

The different kinds of machines now employed in reaping the grain crops are not only numerous, but expensive. The stripper is perhaps the most widely used machine in this colony for harvesting wheat; but those who place some value on the straw prefer the reaper and binder. The expense and labour involved in stacking and thrashing the crops is saved by using the stripper, but the reaper and binder is doubtless the best machine to employ where stock are maintained on the farm. In times of drought a stack of good straw comes in very useful at times. It is well to have both machines on the farm. Where the stripper only is available the wheat-grower has to wait until his crops are dead ripe before commencing harvest, and he runs a great risk thereby in losing them by fire or storm; whereas the reaper and binder can be started while the crops are still comparatively green, and as much hay secured as may be required before the balance of the crop is ready for the stripper or in danger of a wind-storm. The most modern reaping machine is the "complete harvester," which is an improvement on the stripper in this respect, that it winnows and bags the grain all ready for market. These machines are wonders of ingenuity, and would be more generally employed if they were less costly to purchase.

CLEANING GRAIN FOR MARKET.

Grain-buyers and millers frequently complain of the wheat not being properly cleaned, and they have reason to do so sometimes. Many farmers appear to consider that putting it once through the winnower, if the crop has been harvested with the stripper, or bagging the grain direct from the thrashing machine, is all that is necessary. The piles of rubbish—consisting of chaff, leaves, wild oats, and other weed seeds—that are to be seen in the vicinity of flour-mills testify to the quantity of dirt that is contained in each bag of grain. In purchasing wheat the miller (in self-defence) must make a deduction for the percentage of foreign matter which accompanies each consignment he receives, and other grain-buyers, who are purchasing for export, do likewise. If farmers could be induced to more carefully clean their corn before sending it to market, and thus avoid paying freight on all the rubbish their bags contain, something would be done towards making grain-growing more profitable. Farmers, on the other hand, assert that grain buyers at railway stations exercise very little discretion in purchasing, and so long as the sample is up to standard weight little regard is paid to its cleanness. The consequence is that the owner of dirty wheat may sometimes obtain as much for his grain as one who sends in a clean sample. But this is the exception, and, though defects

are occasionally allowed to pass unnoticed, the grower has almost invariably to suffer the loss attendant upon badly cleaned grain. The farmer should aim at growing clean crops and selling only clean grain. The rubbish and light corn can be more profitably utilised as feed for pigs and poultry.

BAGGING THE WHEAT.

Farmers should be careful to use only new bags if they wish to secure the highest market price for their wheat. Every season there is a complaint from some quarter of losses incurred from the near-sighted policy of putting new grain into old bags. If grain is locally put in bags which will not bear the wear, tear, rough handling of railway, river, or sea transit, the chances are that the price will be considerably affected, as agents are not likely to run the risk of shipping indifferently bagged grain for a long sea voyage, and must indemnify themselves against any chance of loss by paying only a lower price for the produce than they otherwise would if the stuff was put into bags that were strong enough for the journey.

STACKING AND THATCHING.

There is no kind of harvest work in which there is more diversity of style and quality of workmanship than in building a cornstack. Some of the designs are curiosities to behold, and when they finally settle down it is difficult to say whether they were intended for a stack or a muck-heap. Some are round and some are square, but the great majority are neither round nor square. Many are so irregular in shape and contour that their outline baffles description. While admitting that a very unshapely stack, if sufficiently thatched, will keep dry for a season, it is desirable that all stacks should be neatly and properly built. The more tidy and trim a stack looks after being built the less thatching it will require. Almost every farmer knows how to place the sheaves in stack-building, but a good deal of practice and skill are required to execute the work as it should be done. When the straw is short and slippery from the heat of the sun, it is very difficult to build a nice stack, more especially of a round shape. The oblong form is much easier to build, and although more thatch is required it is not so difficult to put on or tie down. There is another advantage of the square or oblong stack. It can be covered with sheet iron instead of thatch. The iron sheets are fastened together at the top, one slightly overlapping the other, in such a way that hardly a drop of rain will get through. These hang down each side, and are made fast by wire attached to stakes driven into the body of the stack. Another plan which some adopt is to build the stack with a flat top, or without a top at all, so to speak, with just enough slope to run the water off the iron that is subsequently laid on as a roof. This method does away with the trouble of fixing the sheets of zinc at the apex, and is equally effective in keeping the stack dry.

THE OIL FLY.

The Rome correspondent of the *Morning Post* writes:—An interesting discovery has just been made at Lecce, in South-eastern Italy, by peasants who, while burning a quantity of weeds to warm themselves, noticed that as the weeds burned a number of insects escaped from them into the air. Examining some of the insects, they were found to be the terrible *Mosoa olearia*, or oil fly, which has devastated the olive yards of South-eastern Italy for the last two years. Further examination showed that the insects came out of the capsules of a species of wild onion, which is very common in those provinces. A number of wild onion stalks were gathered and carefully examined. All of them were found to contain oil flies, some having as many as forty or fifty. The discovery is of the greatest importance, as it will facilitate the war against the oil fly, hitherto carried on without much success.

Dairying.

JERSEYS.

SOME NOTES ON THEIR ORIGIN, IMPROVEMENT, MERITS, AND LOCAL HISTORY.

By ALFRED GORRIE.

Considering the important position the Jersey cow holds in the dairying world, it seems superfluous for one in Queensland to add further testimony to her great dairying qualities; but, as dairying in Queensland is only in its infancy, it is but right that our dairymen should know what a goldmine the Jersey cow is if properly developed. Now, as an experienced miner would never prospect for gold on a coalfield, neither should a farmer cling to his grade Jersey bull and fancy he has found a goldmine. A great mistake, as any dairyman will find to his cost, is the using of grade bulls of any breed, but I don't think there was ever a greater lot of rubbish used as bulls in Queensland than many of the so-called Jerseys of to-day. The fact of the matter is, our dairymen know little or nothing about the breed, but have heard sufficient of their good qualities to make them curious enough to try a Jersey, but not interested sufficiently to pay the price of one having an undoubted pedigree. Others have been foolish enough to rear a bull calf with cool disregard for the dairying qualities of its dam, simply because it showed some Jersey colour. As a result, most of the bulls called Jerseys are poor grades kept because of their Jersey colour, irrespective of the milking qualities of their dams, and showing no more dairy form than an old tom cat. Therefore, let dairymen who would participate in the Jersey dividends see to it that the blood of the "head of the herd" is absolutely pure.

Richness of milk is one of the chief characteristics of the Jersey, and her standard of quality is much higher than that of any other dairy breed. It is this quality of milk that makes the Jersey such a veritable goldmine. Quantity and quality of food act on the quality of a cow's milk only to the extent of bringing her up to her limit, above which point she will not go. She can be made to produce more milk by liberal feeding and good management, but there is a limit to the quality of all cow's milk, and, as that limit is higher in the Jersey cow than in any other breed, it stands to reason that she will produce more butter fat when under full feeding pressure than any of her competitors. When the cow consumes her food it rests with her whether she will make fat for her back or fat for the bucket, and somehow or other the disposition of the Jersey is in favour of the bucket. This is not so surprising when it is considered that the Jersey cow never was bred for beef, and for centuries has been treasured by the Jerseyman for her dairy qualities, while most other dairy breeds have, at different times, had to play the part of a dual purpose cow or are indebted to some or other of the beef breeds for their origin.

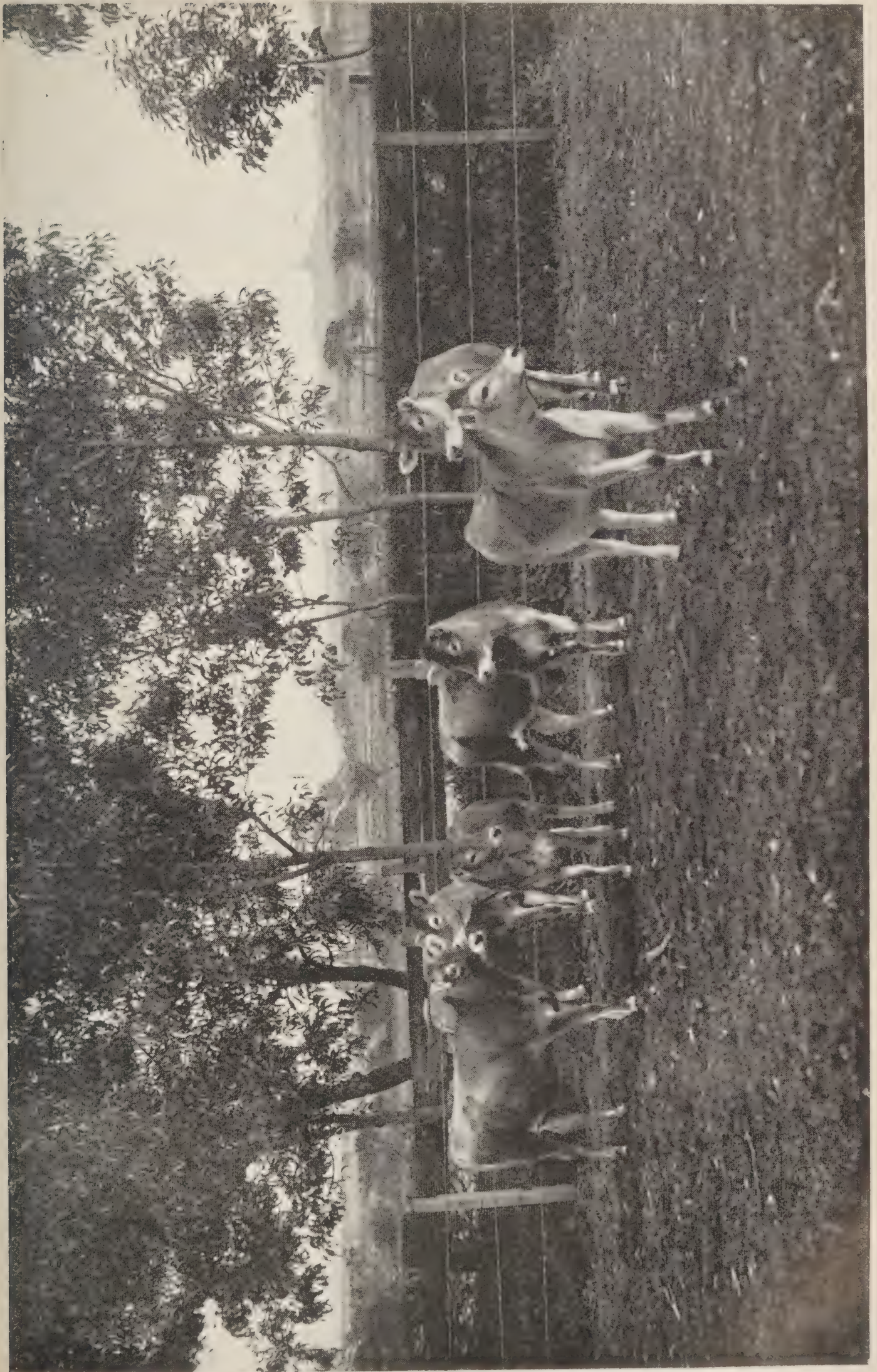
EARLY HISTORY OF THE BREED.

The fullest particulars of the Jersey breed are found in several volumes of the Journal of the Royal Agricultural Society of England, and in Mr. Thornton's History, prefixed as an introduction to Volume 1 of the English Herd Book of Jersey Cattle, and reprinted in the first volume of the Queensland Dairy Herd Book; and can be obtained from Messrs. Gordon and Gotch. The "Journal" (Volume V.) also contains Colonel le Couteur's "Treatise on the Jersey, misnamed the Alderney Cow." It appears that their origin is unknown, but it is on record that they have been bred pure for over 500 years. However, more than a century ago, her characteristics were so thoroughly and persistently fixed and passed with such certainty to her offspring, and had so completely



"MILKLAD 4TH," THE PROPERTY OF MR. ALFRED GORRIE, CARINA, BRISBANE.

1897-1901. The Queensland Agricultural Journal. Part V. Plate XXXII. The property of Mr. Alfred Gorrie, Carina, Brisbane. The bull is a Friesian, and is a very fine specimen of the breed. It was shown at the Brisbane Exhibition of 1900, and won a first prize. It is now in the possession of Mr. Alfred Gorrie, Carina, Brisbane.



GROUP OF HEIFERS BY "MILKLAD 4111"



1. "CLARIBELLE," THE PROPERTY OF MR. JAS. McCULLOCK, BARHOLM, VICTORIA.
First and Champion Royal Show, Melbourne, 1899; First and Champion Royal Show, Melbourne, 1900.

2. "MADEIRA 5TH," THE PROPERTY OF MR. GEO. T. CHIRNSIDE, WOORIBEE PARK, VICTORIA.
Winner of £100 Butter Test Prize at the Royal Show, Melbourne, 1900.

proved her superiority as a butter-producer that the islander was not to remain without some protection against the introduction and admixture of inferior cattle. Therefore, in 1763 and 1789, Acts of the States of Jersey were passed, prohibiting, under heavy penalties (£200 and confiscation of cattle and boat), the importation into Jersey of bull, cow, or calf. This, however, did not apply to Guernsey, and a few animals from that island found their way to Jersey, There they were never appreciated, being larger of stature, coarser of limb, and less thoroughbred looking than the Jersey.

The yield of milk is larger in the Guernsey, yet the Jersey will yield more butter, and is a smaller consumer of food. And when large yields of milk are spoken of as coming from an Alderney cow, it is more often found to be from a Guernsey than a Jersey. Crosses between the breeds never pleased the Jerseyman either, as the pink nose and red rims to the eyes always appeared in the offspring. Those points, together with a coarseness quite foreign to the purebred Jersey, are at once detected by the Jersey judge.

THE ALDERNEY STILL UNIMPORTANT.

The name of Alderney is indiscriminately applied to all the cattle of the Channel Islands. As a matter of fact, the true Alderney never was an important cow, and one writer, Mr. George Culley, in his "Observations on Live Stock, 1807," considered the Alderney breed scarcely worth the trouble of naming at all, as he considered them far too delicate and tender, requiring the best of treatment. This probably accounts for the mistaken belief that the Jersey is a delicate animal. The experience of breeders all over the world is that the Jersey readily adapts herself to all sorts of climates and conditions. The difference between the Jersey and Guernsey is very marked both in size and colour, and also in the head, horns, eyes, and nose. The Jersey is the smaller animal, more symmetrical in form and deer-like in appearance. The horns are thinner and more crumpled, the face finer, more dished, and altogether more intelligent in appearance. The eye is large, bright, and black, with a white rim; the muzzle intensely black, encircled also by a white rim, nostrils high and open. One of the most striking differences between the Jersey and Guernsey is the flesh-coloured muzzle and the red rim round the eyes of the latter. Those two characteristics will always appear in the offspring of the Guernsey, even though they were crossed with the Jersey for generations.

TESTING JERSEY MILK.

The milk of Jersey cows is not easily tested by sample. On account of the larger size of the butter globules of this than any other breed of dairy cattle the cream rises quickly. Several samples drawn at one time from a bucket of milk fresh from the cow have been found to differ considerably, the quantity of butter fat being greatest in the sample drawn from near the top and least in the sample drawn from near the bottom. The most satisfactory way of testing her milk is to pour it from one bucket to another several times, then quickly draw three samples from different depths of the pail; mix them, and then draw your sample for testing. This should be done immediately the milk is drawn from the cow, and the final test bottled while the milk is still warm, otherwise it is impossible to get a fair test of the quality of a Jersey cow's milk. The weight of Jersey milk is less per gallon than the average of milk in general, which is reckoned at about $10\frac{1}{3}$ lb. to the gallon. About 10 lb. (or very little over) to the gallon could be considered near the average of Jersey milk. The richer the milk in butter fat the less its specific gravity.

There has been much discussion in Australia as to the size and weight of a typical Jersey cow. In Jersey a full-grown cow, when in milk, weighs about 800 lb., or about 400 lb. less than a milking Shorthorn. But in Jersey the animals are all kept tethered, and so do not develop in the same way as they do in Australia, where they have their liberty. The weight of a well-grown Jersey cow, bred in Australia, would probably be about 200 lb. more than a full-grown cow on the island; and she would also be larger of stature than the island bred cow.

CAPABILITIES AS A BUTTER-PRODUCER.

How much butter a Jersey cow can produce in a week is hard to say; in the hands of practical feeders her capacity seems unlimited. On the island, where they do not study the feeding question to any extent, and the cows rely on what they get under the tethering system, a fair average is about 10 lb. of butter per week; 12 lb. and 14 lb. of butter per week is common on the island, but, of course, above the average. In England, under full pressure of feeding, some very high records have been registered, but extreme instances are not of much use when dealing with the breed as a whole. It might be interesting to know the average of twenty cows selected from the winners of dairy tests at some of the principal English shows, not including instances where extreme records were put up. The average daily weight of the milk of these twenty cows was $37\frac{1}{4}$ lb., and the average weight of butter from that milk 2 lb. 3 oz. The test at a show, as all breeders know, good as it may be, is always unfavourable to the cow.

Though the Jersey has proved herself a valuable cow on the island, and capable of more than holding her own in England, it has remained for the Americans to develop her to the fullest extent. By a system of liberal feeding, and the practice of supplying food, rich in the elements of milk and butter, Jersey cows are capable of producing as much as 30 lb. of butter per week. It is hardly necessary to say that that is above the average; but as 12 and 14 lb. per week is common on the island, so is 20 and 22 lb. per week common in America. There are many, no doubt, quite incredulous when they hear of American achievements; but, knowing something of their practical methods, and how jealously the Council of the American Jersey Cattle Club guard the honour of their herd-book, I can assure you that any records published by the American Jersey Cattle Club are very real indeed. The Americans found the Jersey capable of development; and with that energy, born only of enthusiasm, they set to work. Finding out her characteristics respecting her gentle but nervous temperament, they found her—

Like clay in the hands of a potter,

capable of being moulded into the greatest perfection of cow aristocracy, and they moulded her accordingly, but by different means to those adopted here in dealing with the average dairy cow. There, the cow has the entire sympathy of the enthusiast, and as much of the right kind of fodder as it is safe to tax her digestive organs with, and the milking is conducted with the greatest regard for the cow's temperament. Here, she is fed without regard to what constitutes a well-balanced ration; and the cow has to study the temper of the milkboy or take the consequences, which might mean a knock from anything within reach, or, failing any handy weapon, a tickling on the ribs with the toe of the ill-tempered youth's boot. Usually, she takes the consequence and with it all, or nearly all, the cream that would under most favourable conditions have gone into the bucket. It is not generally known that the cream comes from quite a different compartment in the cow's udder to the milk, and, while the compartment holding the milk is large, the nervous system has not the same control over that as it has over the smaller cream compartment; and unless the Jersey cow—a highly nervous animal—is in thorough sympathy with the milker, she will never produce to her full extent. Those who know the Jersey know that the best results are only obtained from her by kindness and careful milking. One writer sums the Jersey cow up in the following manner, and “regrets that in this land of the free the ‘pretty maid’ who goes a-milking is generally a boy devoid of that subtle sympathy the wise little Jersey appreciates. Then the substitution of the male sex will compass the loss to our artistic sense in marring the picture as Shakespeare painted it ‘when the pretty shaped hands plied their task.’ Small as is the Jersey, she combines in her economy more admirable qualities than all other cattle upon a thousand hills,” and as ‘pretty is who pretty does,’ besides being matchless she is a mint of money to her owner in a butter-making

capacity, and quite as phenomenal in her gilt-edged exploits as her feathered friend of the barnyard who 'shelled out' the golden eggs. She is emphatically the 'cow with the crumpled horn' who has tossed more dogs and worried more cats and killed more rats of unbelief and prejudice in the house of every Jack who did not love her, apparently, than any known quadruped. Jerseys have come up through great tribulation, and have fought their way step by step, until their position is as impregnable as Gibraltar, in that the foundation of the Jersey breed is laid upon the established truth that they are as useful as they are ornamental."

Unrivalled as a park ornament, firmly established as the dairymen's best friend, she has now to lend herself as an advertising medium for selling one or two of the leading makes of cream separators, the clever agents advertising:—"We two—the Jersey and separator—are the dairymen's friends."

LOCAL HISTORY.

Though Jersey cattle were imported to Queensland nearly thirty years ago, and at different intervals since, it cannot be said that any serious attempts were made to establish stud herds until quite recently. That there were many good animals amongst the early importations there is no denying. Even to-day there are a few of those cows that were brought here in the eighties proving themselves still profitable dairy cows; and I could mention two instances at least where those old cows are thought so highly of that money would not tempt their present owners to part with them. It says much for the longevity and prepotency of the breed, that cows imported here over seventeen years ago are still profitable matrons. Considering the quality of many of the animals that comprised the early importations, it is a matter of regret that so little attempt was then made to found herds. What we have now left of the early arrivals are a few of those that found their way to private houses—those that went into the possession of farmers being allowed, after a while, to run with the common herd, leaving no pure-bred progeny behind them. The reason of this, undoubtedly, was the unsatisfactory state of our dairying industry at about that time. When it is considered that 3d. per lb. was the average price of summer butter at Roma-street markets, it is not surprising that farmers paid little attention to improving their dairy herds. With the introduction of the butter factory system came profits instead of losses to the dairy farmer; and now, with the system in operation but a few years, the dairying industry is probably the most profitable, and certainly the most reliable in Queensland.

It is satisfactory to note that, with the improvement of the dairying industry, and the use of the Babcock milk-tester, many dairymen are now attempting to improve their herds by the introduction of Jersey bulls; but it cannot be too strongly pointed out that, unless a bull is of undoubted and absolute purity of blood, he cannot transmit to his progeny those great dairy qualities for which the Jersey is so justly famed. That there are now breeders in Queensland from whom farmers can obtain Jersey bulls of high lineage, there is no doubt. As a result of recent liberal purchases and importations, Queensland rejoices in some of the most fashionable Jersey blood in the world, as a reference to the Queensland Dairy Herd Book will show.

PROFITABLE AND UNPROFITABLE PIG-KEEPING.

Professor Blundell's statement as to the profits of feeding bacon pigs are much contested by a writer in the *Scottish Farmer*, who says:—

The problem of profitable pig-keeping is not so simple as some seem to imagine; the fact is that only under very favourable conditions can they be kept at a profit at all. In this country (Scotland), at least, if everything has to be bought in to feed them it is almost impossible to make them pay, and even where there is a considerable amount of rough food obtainable, which would practically be otherwise wasted, or could not properly be fully utilised, the profit from them is a very doubtful quantity, and I am of opinion that if a strict account was

kept by some who are in the habit of keeping several, and who have not at command sufficiency of rough food, if such an account were kept their eyes would be opened to a very unpleasant fact. I have known two or three instances where strict accounts were kept, and all found they had cost from 2d. to 3d. per lb. more than they would fetch in the market. The question may very naturally be asked, How, then, does it come to pass that they continue to be so popular? Well, the fact is that pigs are a sort of savings bank for working people, and, as they must be fed, when once bought, their food is purchased probably in small quantities often, whether Tommy's knickerbockers are got or not; and thus the money is kept together, and a large addition eventually added to the family's food supply, which has been got together so gradually that the cost of the food which has had to be bought is not so seriously felt, but of this I am certain that three-fourths of such pigs die in debt and do not pay for the food they have eaten. Of course, when there are no other means of disposing of the scraps and slops from the waste of a household, pigs will always be profitable if properly managed, but the limit of profitableness is soon passed, and those who make a practice of breeding pigs make the greatest profit, for the trade is very bad indeed if the breeding of young pigs does not pay. In some cases the profit is extraordinary. I knew a case where a farmer purchased a pure-bred Berkshire sow for £4 that produced four litters in two years, and each litter sold for 10 guineas, and the sow herself was sold for £7 after rearing the fourth litter, so that this pig yielded a gross return of £45 in a little over two years. I have been familiar with pig-breeding my whole life, and have known that breeding paid all along, if the breeder was at all fortunate; and that is the only phase of pig-keeping that may be relied on under ordinary conditions to give a fair profit almost at any time. But I strongly advise anyone to keep strict account of all expenses, and make sure that they do not give all their labour away for less than nothing, and, instead of making a profit, actually suffer a loss, if the pork is valued in the only sound way—viz., at what it is worth in the market, always giving due allowance for the superior value of such home-fed pork over American-fed pork. In a paper read before the Cirencester Chamber of Agriculture recently Professor Blundell said that it was his opinion that the pig, if properly managed, will do the most towards paying the rent of any animal. I am sorry that, after about half-a-century's practical experience, I cannot share his confidence. He, however, guards his assertion by saying "if they are properly managed." I freely admit what it would be idle to deny, that there are conditions under which they do pay, but in a very large number of instances they do not pay for the food they eat. Low as the profit is from cattle and sheep, I will yet hang my hat on both cattle and sheep for yielding the better profit. If the professor can suggest a plan for their management that can be adapted to ordinary conditions to ensure a good return he will do a real service, as it is undeniable that as presently managed the returns are in some cases anything but profitable.

WHY THE PIG PAYS.

A few weeks ago a paper on pig-raising was read by Professor Blundell before the Cirencester Chamber of Agriculture, in which he stated that the pig, if properly bred and managed, would do more than any other class of stock towards paying the rent. He argued from the standpoint of the comparative average life of the pig, teg, and bullock. The pig's average life before he is ready to be turned into bacon is calculated at thirty-three weeks, that of the teg sixty weeks, and of the bullock 130 weeks. It stands to reason, therefore, he says, that the capital invested in pigs can be turned over three or four times as quickly as it is possible with any other class of stock. There can be no gainsaying that this is a very desirable recommendation for the pig-raising industry. Not many Southern farmers in this State rent their farms from a proprietor. Nearly all are themselves proprietors of their land, either in fee-simple or are paying annual instalments of the purchase money to the Government. Hence we are not in the habit of looking at the pig as the

gentleman who pays the rent. Still he is such a valuable portion of the farm stock that no farmer can afford to neglect him, especially if the farmer be a man of limited capital. There is always a good demand at fair prices for good bacon pigs, and the requirements of the bacon factories are such that it is unlikely that prices will drop to an unremunerative point.

Professor Blundell recommends barley-meal as one of the best foods that can be used, particularly when mixed with skim milk or whey. It is a wholesome and growth-giving food, conducive to high quality. Wheat may be mixed with the barley in the proportion of 1 of wheat to 2 of barley.

Maize, as all farmers know, will cause pigs to rapidly put on weight, but it is more of a fat than a flesh producer, and should therefore be used sparingly if quality of carcass is aimed at.

The cost of feeding young pigs running out on grass, and having maize or peas at the rate of 1 lb. per day, the professor sets down at $\frac{1}{2}$ d. for that time, and, unless English barley will realise more than 28s., he thinks it would be more profitable to feed it to pigs than to sell it as grain. He calculates that by giving barley to pigs 9s. per cwt. is returned to the breeder, whereas by selling for malting purposes at the price mentioned it is only equal to 7s. 6d. per cwt.

These figures are worth considering, and even where the actual cash profit on the pig is small, yet the returns are so quick that the money is turned over five or six times whilst the returns from the bullock are being turned over once, and thus the interest gained on the capital invested is all the greater.

LEECHES IN A COW'S UDDER.

In connection with the discovery by Mr. Andrew Gallagher, of Tallebudgera, Southern Queensland, of leeches supposed to have passed during milking from a cow's udder, Mr. C. D. Whitty, Stock Inspector of New South Wales, forwarded the specimens to Mr. F. McCaffrey, Dairymen's Exchange, Brisbane, for investigation. That gentleman has furnished the Chief Inspector of Stock, Mr. P. R. Gordon, the subjoined interesting letter on the subject:—

I beg to inform you that I have thoroughly investigated the facts connected with those leech specimens which I took to your office a few days ago in company with your Mr. Quinnell.

As stated on that occasion, I obtained the specimens from Mr. C. D. Whitty, Stock Inspector, Tweed Heads, New South Wales, which were supposed to have been taken from a cow's udder while being milked.

We have had reports from time to time of leeches having been found half-way up a cow's teat; but it has always been doubted whether a leech, requiring air to live, could pass right into the cow's udder, and thereby destroy the organ.

In this case, we have ample proof. The facts are these: A Mr. Andrew Gallagher, of Tallebudgera, Southern Queensland, bought a cow from a Mr. Kieran Doolan, of New South Wales. This cow was eight years old, had had calves, but, in dairymen's phraseology, she was never broken in. In due course she had another calf, and Mr. Gallagher was so satisfied with her milk show that he decided to break her in for his own use.

To his surprise, one of her hind teats was completely blind and contained no milk. The other hind teat appeared to have milk in it, and he started to work to save the teat.

After spending some time at the operation, he forced out the fragments of seven leeches and the two whole specimens which I handed to you in your office.

Thus you will see that no less than nine leeches were taken from one teat. We have every reason to believe that the other hind teat was ruined by the leeches.

If this is not worthy of your special attention, it would be difficult for me to find a more interesting discovery, as no doubt there are scores of valuable cows ruined in this manner.

I may mention, in conclusion, that this cow was grazing near a saltwater creek.

FRANK McCAFFREY.

THE DAIRY HERD.
QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST MARCH, 1901.

Name of Cow.	Breed.	Date of Calving.	Yield.	Per cent. Butter Fat, Babcock Test.	Com- mercial Butter.	Remarks.
			Lb.			
Rosebud ...	Ayrshire ...	10 April, 1900	618	3·6	24·9	
Ream ...	" ...	24 July "	560	3·8	23·83	
Isabelle ...	" ...	7 July "	611	3·8	26·0	
Lena ...	" ...	13 July "	604	3·8	25·7	
Leesome ...	" ...	1 Sept. "	857	3·7	35·51	
Ream Routhie ...	" ...	20 Sept. "	557	3·8	23·70	
Ruth ...	" ...	8 Oct. "	512	3·7	21·21	With first calf
Renown ...	" ...	29 Nov. "	586	3·8	24·94	With first calf
Annie ...	" ...	8 Oct. "	102	3·9	4·45	Dried off, 22-3-01
Laura ...	" ...	28 Aug. "	547	3·8	23·28	With first calf
Laverock ...	" ...	19 Dec. "	910	3·6	36·69	
Jersey Belle ...	Jersey ...	21 May "	342	4·6	17·61	
Content ...	" ...	18 July "	485	4·9	26·61	
Playful ...	" ...	14 July "	715	4·1	32·83	
Baroness ...	" ...	3 Aug. "	494	5·0	27·66	
Carrie ...	" ...	18 Aug. "	541	4·7	28·47	With first calf
Spec ...	" ...	26 Aug. "	436	4·6	22·46	With first calf
Stumpy ...	" ...	29 Aug. "	751	4·3	36·16	
Evileen ...	" ...	2 Sept. "	554	5·0	31·02	
Beatrice ...	" ...	3 Sept. "	403	5·0	22·56	
Connie ...	" ...	8 Sept. "	502	4·8	26·98	
Ivy ...	" ...	28 Aug. "	444	4·5	22·37	
Bashful ...	" ...	2 Nov. "	490	4·8	26·34	
Russet ...	Grade Shorthorn	7 Oct. "	558	4·0	24·99	
Alice ...	" "	13 Nov. "	737	3·6	29·71	
Eva ...	" "	18 May "	106	3·6	4·27	Dried off, 22-3-01
Stranger ...	" "	7 July "	615	3·7	25·48	
Duchess ...	" "	24 Aug. "	512	3·9	22·36	
Restless ...	" "	3 Sept. "	663	3·6	26·73	
Rosella ...	" "	5 Sept. "	764	3·6	30·86	
Lucy ...	" "	27 Sept. "	715	3·5	28·02	
Leopard ...	" "	29 Sept. "	553	3·6	22·29	
Redmond ...	" "	12 Sept. "	752	3·5	29·47	
Pet ...	Grade Jersey	14 Aug. "	390	3·5	15·28	
Fancy ...	South Coast	21 May "	433	4·3	20·85	
Violet ...	Shorthorn	9 Oct. "	717	3·8	30·51	
Gladdy ...	" ...	2 May "	122	4·4	6·012	Dry, 21-4-01
Louisa ...	" ...	6 April "	485	3·5	19·01	
Nestor ...	" ...	21 April "	131	4·4	6·45	Dry, 23-4-01
Spot ...	" ...	11 Sept. "	517	3·8	22·0	
Kit ...	" ...	28 Sept. "	733	4·0	32·83	
Plover ...	" ...	3 July "	742	3·6	29·9	
Queenie ...	" ...	29 April "	120	4·0	5·37	Dry, 23-4-01
Frizzy ...	" ...	23 Aug. "	615	3·9	26·86	
Maggie ...	" ...	20 June "	134	3·9	5·85	Dry, 23-4-01
Laurel ...	" ...	10 Sept. "	549	3·6	22·13	
Empress ...	" ...	20 Nov. "	714	3·5	27·98	
Curly ...	" ...	10 Dec., 1899	724	3·8	30·81	
Trial ...	" ...	31 Oct., 1900	873	4·0	39·11	
Pansy ...	Grade Jersey	4 Dec. "	685	3·8	29·15	With first calf
Rusty ...	Grade Shorthorn	23 Dec. "	861	3·6	35·23	
Polly ...	" "	21 Feb., 1901	788	3·8	33·53	
Effie ...	Jersey	6 Jan. "	840	4·8	45·15	
Blink ...	Ayrshire	21 Feb. "	1,072	3·8	45·62	
Damsel ...	Holstein	19 Jan. "	1,095	3·4	41·69	
Dairymaid ...	"	3 Mar. "	780	3·3	28·8	
Ginger ...	Grade Shorthorn	19 Dec., 1900	874	3·6	35·23	

The dairy herd grazed on natural pasture during the period.

Poultry.

THE DORKING AS A TABLE FOWL.

A very great number of poultry-keepers, as well as "poultry-eaters," regard the Dorking fowl as the king of table poultry. It is one of the worthiest breeds we have, and it is much to be desired that its cultivation should increase, and not diminish. In ordinary poultry yards it is not often kept pure, but generally crossed with some other breed, which adds hardiness to the offspring, but in no way improves the table qualities; indeed, often the reverse. We suppose few people cultivate it for egg production, as it is exceeded by many other breeds for this purpose, but keep it almost wholly for its table qualities. No doubt many would prefer to keep it pure if the chickens were just a shade more hardy, and we are surprised that the idea of running the sub-varieties together has not occurred to utility breeders generally. Not only is size somewhat increased by this means, but all the best qualities of the fowl are produced in fuller abundance, while the chickens are all that can be desired in point of hardiness and rapidity of growth. To fanciers alone might this proceeding appear objectionable, but the birds are not supposed to appear in the show pen, although, for the matter of that, they remain Dorkings pure and simple. There is really no reason, however, why, say, a very fine Silver Grey, which has been produced from the union of Silver Grey and coloured parents, should not be exhibited in a Dorking class and be awarded, if need be, premier honours. But if the bird were to be claimed at a high price for stock purposes by another breeder, then we hold that the latter should first be informed of its pedigree. We are dealing mainly with the utility breeder in these notes, however, and we repeat that for his own purposes he need never hesitate to cross the Silver Greys with the Coloured, or the White with the Coloured. From the offspring he will get the best of everything the Dorking can give.—*Farmer and Stockbreeder.*

ANIMAL FOOD FOR FOWLS.

The same journal says:—Most people, we daresay, know when to draw the line with regard to the supply of animal food to their fowls. Yet there are some who utterly ruin their birds by systematically giving a surfeit of this aliment. There are few things more detrimental to the well-being of poultry than an excess of animal food. A breeder once wrote us, saying he had a large number of fowls, and, although he kept a supply of horseflesh continually hanging up in the run for the birds to peck at, he got hardly any eggs, and the birds appeared listless and unhealthy. And no wonder! Birds subjected to such treatment were only qualifying for a miserable death. There are some occasions when animal food should not be given at all. When the birds have their liberty it should never be given in warm weather. It is totally out of place then. The birds get as much healthy insect and animal food as they require, and a sufficiency of rich green food to balance it and act as a corrective. Birds kept always in confinement may have an occasional allowance, even in warm weather, as they have no opportunity of securing insect life for themselves, and when there is an abundance of green food supplied at the same time no harm is likely to result. But the animal food should not be represented by horseflesh; the latter is much too strong and coarse for use in warm weather. It may do well enough for occasional use in winter, and it is just as well to confine its use to that period. A much better article for summer use is bullock's liver, boiled and grated fine, or one of the fish foods specially manufactured for poultry. Even during winter a large allowance of animal food should not be given daily. On mild days it should be omitted altogether, and a strictly moderate allowance given on cold days only. The class of animal food should also be varied occasionally.

AN EGG FARM

Should be stocked with non-sitters, so-called—the Leghorns, Hamburgs, Houdans, Polish, Spanish, Minorcas. The white Leghorn, Minorca, and Houdan lay the largest eggs; Hamburgs the smallest of any of the breeds named.

When meat is not any object in the keeping of fowls, some one or more of these should form the stock.

If the egg farmer doesn't wish to raise his own chicks from which to renew or increase his stock, there need to be kept no males whatever.

The majority of people who do not keep fowls thinks that males are as necessary in the production of eggs as are the females; whereas, the males are only needed for fertilising the eggs for hatching. Indeed, the hen will do a trifle better in laying if never molested by his honour.

It must be admitted, though, that the cock is not a bad fellow to have in the flock that runs at large among trees, tall weeds, grass, or elsewhere, if "varmints" are around, as he is more alert than his consorts, and acts the part of sentinel to the weaker sex. This office and that of making eggs hatchable are all he is really needed for, and not for his alertness against vermin if the layers be fenced within the usual yard.

This uselessness of the male should be heeded by every egg farmer who handles chickens for eggs only, unless he be kept for the purposes stated. Sometimes the male is an absolute annoyance to the females, and hinders egg yield to a much greater extent than is commonly believed.

This branch of practical poultry culture is the basis of the whole business. It is the foundation on which rests the entire poultry structure with all its various branches. It is more—the fancy rests upon it; thoroughbred poultry culture depends upon it.

And this being true, the day shall come when even the most fanciful of all varieties and breeds, if it be a poor nest-maker, will be superseded by the better money-maker. The family fancy fowl is all right in its place, and we couldn't get on without it; but business before pleasure here as elsewhere.—*Australian Farm and Home.*

UNFERTILE EGGS.

The sterility of eggs may arise from various causes. Over-feeding is a very common one, and especially over-feeding penned-up fowls on Indian corn. Winter rations have really not been needed, for the weather, although wet and unpleasant, has not been cold, and it is quite possible the poultry have been made too fat. Then sometimes the cock's spurs have grown too long and very pointed; these points can be pared down well with a stout sharp pen-knife until the first drop of blood appears, when the cutting must at once cease, or the ends can be blunted with a file. The spur should not be roughly handled when blunting or shortening, for if it be loosened at the leg it is very tender until it again grows sound and fast.

If some of the eggs be fertile and others clear, the cause may be, amongst others, either neglect on the part of the cock or some fault of the hen. In some cases the average of the fertility of the eggs may be improved by taking away to another pen those hens which lay fertile eggs, when they are known, for a day or two, and then putting them back for a like period, and so on until some improvement is noticed. The pens should be as much alike as possible, so that the fowls may feel at home, and obviously they should be kept isolated from a cock. This temporary absence is at times quite beneficial to some hens, which become weakened by the too constant attention of the cock, and they, in consequence, begin to lay clear eggs. Sometimes one hen is the favourite of the cock, to the neglect of the others; in this case the hen should be taken

away for a time. This may be suspected if only a small percentage of the eggs are fertile, especially if those eggs look as if they had been laid by one hen, and often the question may be settled by watching the fowls in the pen. Sterility may sometimes be overcome by removing the cock during the day and putting him back at evening feeding time, or keeping him away altogether for a couple of days at a time, and then giving only a few hours' run with the hens. When all kinds of dodges have been tried, and the feeding and housing are not at fault, and yet the eggs are clear, you may conclude the fowls will not breed together in the way they are mated. Some cocks will not breed with certain hens, and some hens will not breed with certain cocks. In such extreme cases the sexes should be separated for quite a fortnight, and then an entirely different mating be tried, the fowls being put together even in a different pen if any way possible.

A NEW ROAD-MAKING PROCESS.

County and road supervisors in Southern California are unanimous in the belief that the problem of excellently macadamised roads at small cost has at last been solved, and that solution of it has been attained through the application to them of crude oil. There are now nearly a hundred miles of road in the several counties of the southern part of the State which have been treated in this manner, and so pronounced in every instance and particular has been the success of the trial that there is no doubt that nearly a thousand miles will be put under contract for the treatment during the coming year. It has been found that to place roads in condition through the use of oil is cheaper than maintaining them in half condition during a single season by sprinkling with water. And when a road has once been put into condition with oil it requires but slight additional expenditure to keep it so. On all the mail highways in Los Angeles county oil-coating is now applied. Many of them have out patches of it half-a-mile or a mile in extent, the oil being used upon it to test the effect it will have upon earths of different character, and upon roads of varying qualities. It has been found that where the road had an even, hard foundation, smooth clear ruts, and about 2 inches of dust on the surface, upon this road the oil is a complete success, and gives a surface as polished, clean, and clear as an asphalt street. Where the soil is clayey, though the surface is rutty, it will maintain the hard character of the ground, allay all dust, and prevent the decay by resisting the formation of mud, the oily and impervious ground holding the water in the ruts until it dries out and preserving the earth beneath it from becoming saturated with it. On a road of deep, blue sand, however, the oil appears to show little benefit.

One hundred barrels of oil per mile spread over an area 18 feet in width will put a road in condition along the extent of the oiled surface, and give an excellent roadway for ordinary traffic. The oil is put on in three applications, the first at the rate of sixty barrels per mile, and the two subsequent treatments at a rate of twenty barrels per mile each. Great care must be taken in delivering the oil. It should be hot when discharged, and poured upon a hot surface, so that the work of the oil sprinkling is confined to the heat of the day. The oil cannot be poured on indiscriminately, but must be drilled into the dust as wheat is drilled into land prepared to receive it. If it is not so applied the oil will not saturate evenly the dust area, but will lie in splotches, run together, and so make a very imperfect success, either as a job of sprinkling or as an oiled surface.—*Breeders' Gazette*.

The Orchard.

A NEW INDUSTRY BROUGHT BY AN INSECT.

Mr. D. O'Connor, of Oxley, communicates the following article on the fig industry:—

“A New Industry brought by an Insect” is the title of an interesting article in January number of *The Forum*. It is of sufficient importance to quote in full. Americans have shown in this matter their customary enterprise, and have been rewarded with brilliant success. To harvest 15 tons of figs the first year, of which 6 tons, of first-rate quality, were dried and packed, was an achievement of which they may well be proud.

We Australians have a direct interest in the success of this experiment, as it will enable us to obtain the insect as well as the necessary plants from California instead of the Mediterranean, thus saving time, trouble, and expense. The Agricultural Department imported, three years ago, 100 cuttings and 100 suckers of the Smyrna fig and Capri fig. These, I am informed, have succeeded in several places. The fertilising insect is yet to come, and until it arrives the Capri fig is useless. It has been noticed that the fruit of our Moreton Bay fig-trees are infested with insects; possibly the one required may be found among them. I purpose trying the experiment this season. Will others, more experienced than myself, do likewise? The work is easily performed: either branches containing the infested figs are put into the tree to be treated, or the figs themselves are strung together and hung near the cultivated fruit. Should the experiments fail, as probably they will, I presume that the Department of Agriculture will complete their good work by importing the necessary insect either from California or the Mediterranean.

During all past time the dried fig trade has been controlled by the countries bordering on the Mediterranean Sea and principally by Turkey and Algeria. Figs grow in nearly all warm countries, and superior table figs are found in many localities, including our Southern States and California, but none, when dried, have been found to compare with the so-called Smyrna fig, which has heretofore been grown successfully in Mediterranean regions only. California figs have been dried, and have sold at from $7\frac{1}{2}$ cents ($3\frac{3}{4}$ d.) to 10 cents (5d.) per lb.; but, in the autumn, as soon as the crop of Smyrna figs for the year begins to appear in the market the price of the California product drops, and it has practically no sale. Now, it is certainly not the habit of the United States to allow herself to drop behind any other part of the world; and this characteristic is particularly in evidence in California. That State would not rest under the imputation that she could not supply the world's markets with dried figs equal or superior to those exported from Smyrna and Algiers; so, in 1881, there began a series of experiments which, at last, during the present year has been crowned with success.

The first step was to secure the Smyrna fig-trees. This was begun in 1881 by Mr. G. P. Rixford, of the San Francisco *Bulletin*, who imported 14,000 cuttings, and distributed them to prominent fruit-growers. When these trees came into bearing, however, the fruit failed to mature, dropping to the ground after reaching the size of a marble. It was then thought that the deceitful Smyrniotes had sold us the wrong variety, aiming to keep their monopoly intact, and many growers dug up their young trees in disgust. Then Dr. Eisen, late of the California Academy of Science, showed that since before the Christian era, as pointed out by many early writers, Aristotle and Neophrastus among them, it has been the custom of the Orientals to pluck the fruit of the wild, or so-called Capri, fig-trees at a certain time of the year, and to suspend them in the branches of the Smyrna or cultivated fig-trees. He pointed out also that there issued from the wild figs a little insect, which, covered with

pollen, entered the cultivated figs, and that the latter afterwards developed and ripened into the beautiful, sweet Smyrna fruit. He further pointed out that the young Smyrna fig contains female flowers only; that without the introduction of pollen the seeds will not form, and that upon the formation and maturing of the seeds depend the persistence and ripening of the fig, which is not a fruit of the ordinary kind, but a receptacle filled with a mass of small flowers. It appeared, therefore, that the next step to take was to introduce and establish the wild or Capri fig, with its male pollen-bearing flowers, and then the little insect which carries the pollen. Then the United States Department of Agriculture took a hand, and imported many cuttings of the Capri fig, while an enterprising firm of nurserymen at Frisno imported and planted a large stock of both Smyrna and Capri figs.

When the wild figs came into bearing, in 1890 and 1891, their pollen was artificially introduced with a small quill into a few young Smyrna figs, fertilising their flowers, and causing them to persist and ripen. Then they were dried, and it was found that, although the number of seeds was small, the nutty, aromatic flavour of the Smyrna fig was evident.

To hand-pollenise an orchard of Smyrna figs in this way would have been too great a task, and the next step was an effort to introduce and establish the fertilising insect. Several efforts to accomplish this result were made by private enterprise. The little insect was brought over alive in Capri figs, and issued in this country, but without reproducing. Then, in 1899, the United States Department of Agriculture again took hold, and, through one of its travelling agents, secured over-wintering Capri figs in Algeria, and sent them to California. These figs, in the spring of 1899, gave forth the beneficial insects in the Frisno fig orchards. All through the summer of that year the insects bred undisturbed, passing through four generations, and increasing in numbers; and the winter of 1899-1900 was successfully passed by them in small figs upon three trees protected from the frosts by a canvas shelter. In the spring of 1900 they issued, laid eggs, and another generation developed in the wild figs, and at the proper time were transferred to the Smyrna trees, when they entered the figs and pollenised them, just as their ancestors have done for unnumbered generations in Mediterranean countries.

The Smyrna figs did not drop to the ground, as they had been doing every year since 1889, when the trees first began to bear. They again ripened, and in August and September 15 tons were harvested; of these 6 tons were dried and packed. These figs have been tested chemically, and found to contain 1.4 per cent. more sugar than the imported figs. Moreover, unprejudiced experts have unanimously declared them to be superior to the imported product. This great success means much to the United States. In 1895 we imported 13,440,604 lb. of Smyrna figs, the valuation of which was 698,894 dollars. After the adoption of the tariff law of 1897, which fixed an import duty at 2 cents per lb., shipments to this country decreased, and the importations for 1898 amounted to 7,992,554 lb., having a valuation of 382,784 dollars. In the near future these importations will be practically stopped, as our whole country will be supplied with home-grown dried figs.

But this feature by no means comprises all the possibilities of the industry. America will compete with the Mediterranean countries in the open markets of the world. The character of the product, even of this first year's crop, shows it to be superior to the Oriental product, both from chemical analysis and from expert opinion. Experience gained this year assures a much better result next year, not necessarily in the quality of the fruit itself, but in methods of drying and packing and of producing an attractive product for the market. Cleanliness in packing, prevention of the disgusting worms so often found in the imported Smyrna figs, and other similar points will be carefully attended to by American packers. At present there are by no means enough trees growing in California to bring about this result, but the right varieties will be planted by the thousands during the coming year, and in four or five years will be producing substantial crops.—L. O. Howard, *The Forum*, January, 1901.

Horticulture.

THE CARNATION.

By A. MARSHALL.

PAPER READ BEFORE THE HORTICULTURAL SOCIETY OF QUEENSLAND,
9TH APRIL, 1901.

Although closely approaching the rose in popularity, the carnation has received but little attention at our meetings in the way of papers for the guidance of those of us who, like myself, have but a limited time in which to grow and study it. I only hope my efforts will be followed by others more competent than myself to give information which will tend to arouse even a greater interest than ever in its culture; for taking into consideration its many good qualities, both as regards its freedom of bloom, perfume, and the little trouble it takes to grow and propagate, it should, in my opinion, rank as the queen of flowers.

The carnation was known to be in existence in 1567, although Douglas, in his latest book on carnations, claims that it was grown under the name of "Clove Gilofie" in 1328.

Dianthus caryophyllus is credited with being the progenitor of this flower, and a comparison of this, which is a single flower, with the varieties of the present day, is convincing proof of the rapid strides made in its improvement, although its multiplication did not take place to any extent until the seventeenth century. But the greatest prominence was given to it about three years ago, when Mr. T. W. Lawson paid 30,000 dollars for a single plant.

The carnation has not been extensively grown in our State until of recent years, and very little attempt, if any, was made to cross-fertilise and improve it until Mr. A. McKenzie, to whom a great amount of praise should be given, attempted it and brought out, by careful cross-fertilisation, many new and beautiful varieties, several of which have come to stay, notably E. Grimley, Lady Lamington, Miss Alice, Pink Perfection, C. A. Smith, and others. It is a matter of regret that the movement lately made by this Society to classify and name anything new and of sufficient merit was not in existence then, for no doubt Mr. McKenzie deserved some recognition of his achievements. I spent many an hour looking at the results of his work, in fact, I was never tired of going to see them. He had at one time about 1,000 plants of various colours, of his own raising, all nicely stacked in long rows, everything clean, not a weed to be seen, and, although it was a very dry season, they flowered continually all the winter.

Following him in a smaller way was another of our members, Mr. T. Burns. Some of his varieties are well worthy of being in any collection—namely, tiger, delicator, variables, &c.; and quite recently—at our last National Association Show—I saw a very nice flower raised by Mr. Fox, of Ipswich, which I think surpasses E. Grimley. I feel sure, if only a great many of our amateurs knew how easy it is to cross-fertilise and raise this flower we should soon have varieties as good as, if not better, than could be imported. I, myself, have done a little in this respect with, I think, fair results. One variety I had the pleasure of raising a couple of years ago last spring had on it over 400 blooms at one time. I thought so much of it that I had it photographed. This variety does not require staking, except when in flower, it being of a dwarf habit, but as free in bloom as one could wish, for each bloom is large in size and as dark as, if not

darker, than any carnation I know of. The tree itself measures fully 3 feet through, and stands either drought or water, which speaks well for its hardiness. Most of our imported varieties die off very quickly if subject to too much of either.

I have specially mentioned this variety as an example of what can be achieved by adopting Nature's tactics. Even if one is not successful in first attempts, the lesson one learns fully compensates the true lover of flowers for the little trouble it gives him, not to speak of its being one of the most intellectual and interesting of occupations a person could be at. For it does not matter on what lines you work, it is impossible to forecast with any degree of accuracy what colour you will get.

To begin with, one must have in mind the improvement of the flower in some form or other, either in its habit or flowering properties. In this respect I would strongly advise the beginner to be extra careful in the selection of the plant he intends to become the parent, as well as of the flower to cross with, for on the success of one's first attempt everything depends; if that is not successful one would not make the second with nearly the same amount of interest as if the first were good. I, in my attempt to improve the habit as well as to retain the blooming qualities, selected a white seedling, a semi-double flower named Mont Blanc, and crossed it with a dark flower of McKenzie's strain. The result of this cross was the one I call Victor and Sylvia, which is a pink. The following year I crossed on to Sylvia with a white carnation called Bailey's White (a seedling raised by our late respected member). From this I received a fairly good carnation, which I named Gracillas, and which I have used rather freely for crossing on to on account of its splendid blooming qualities, one called T. Wood's being especially fine. From crossing E. Grimley on to this I raised one very unique colour, greyish, with a cerise stripe.

If you intend to improve the habit of one of a weakly growth you will naturally select a stronger grower for the parent. In doing this you are bound to lose some of the flowering properties but receiving a stronger habit. For I must admit that those carnations of slender growth, or, as they may be called, grassy carnations, are, with few exceptions, the finest bloomers, for as each bud starts to open a slender growth appears just a little lower down on the stem with another bud ready to follow in succession as the other dies. This habit you will not find, except in few instances, in those of very dwarf habits. If you have a strong grower having this tendency I would recommend you to select it for the parent, and I feel certain you will be satisfied with the result.

The results of my experiments, especially the latter ones, have convinced me that in many instances I have what are strictly true carnations. In many cases I have secured, in my opinion, too much of the Marguerite strain. How to get over this difficulty has given me considerable thought, and in conversation with Mr. McKenzie on this subject, he gave me his opinion, which seems feasible enough. That is, supposing in the first instance you use White Clipper for the parent, and cross it with a Marguerite, with the progeny of this cross you will need to cross back again on to White Clipper to do away with the Marguerite strain. I have not had time to test this theory, but it is well worth a trial.

After deciding on the plant to become the parent, you must watch the flower carefully, and when it is just opening take a small pair of scissors and snip off the anthers before they have time to get ripe, so that the stigma will not be able to get fertilised with its own pollen; then when the flower is about fully expanded and when you, on close scrutiny, notice the stigma to be sticky or hairy, take the pollen off the plant you intend to cross with and place it on the stigma of the parent, after which you can tie up the flower to prevent insects interfering with your work. If your cross has been successful the life of the flower is cut short, for after fertilisation takes place it soon fades and dies, and in a very short time you will notice the pod become full and hard. When

your seed is ripe, the pod has a brownish appearance, and on opening it you will find the seeds generally quite black. Then label them and put them away for sowing. The present month is about the best time to sow. Do not sow too deep. I always sow in a small box, covering with a sheet of glass. As soon as the seedlings appear, I quickly give them light and air, and as soon as they are fit to prick out I put them in small pots before finally placing them in the ground. Any amateur, in raising these seeds, cannot be too careful in giving the young seedlings light and air as soon as they appear. A friend of mine once got some extra good seed, and was advised if he wanted to get all to come up, to keep his seeds dark. He faithfully kept to his instructions, for he placed the box under the house, but neglected to give the seedlings light as soon as they showed themselves. The consequence was, they got drawn so much, that as soon as he brought them out they naturally toppled over and died; hence the necessity for hardening off as soon as they appear.

The next thing of importance is the place and soil to plant them in. If you wish to do justice to your plants so as to get good blooms, give them a bed to themselves. Do not plant them between roses and shrubs, for by doing so you do not give them a chance; besides you rob your roses and shrubs of the nutriment they themselves require. Very often a man sees a nice bloom in a florist's window, which induces him to purchase a plant, and when he takes it home he plants it in close proximity to a rose, or, perhaps, on some impoverished piece of soil where he has just dug up a large shrub without putting fresh soil into the place where the tree was taken out; the consequence is that when the plant throws its bloom, it does not compare in any way with the flower which induced him to purchase, and of course the seller is credited with forcing up a large flower, whereas if only reasonable attention were paid on planting, the results would have been fully up to expectations.

When planting carnations, always plant them on the highest part of your land and in virgin soil, for you cannot give them too good a drainage. In fact, drainage is the most important part in the successful growing of the carnation; give them this and plenty of light and ventilation, and they will not only flourish, but under these conditions you will avoid those diseases that naturally attack them under less favourable surroundings. I can speak from experience in this respect, for not having the water laid on to my place, I thought, last September, I would make a bed for trial at the lowest part of my ground. They grew beautifully until last month, when the ground received such a soaking that a great many of them died.

As carnations like an open soil, provided yours is a heavy clay I would, before going in for this flower, drain well, and if they do not thrive well, then I should advise you to remove about 15 inches of the top soil and replace it with good, rotted turf and leaf mould, mixing it with wood ashes or some sand and adding a fair sprinkling of bone dust for all manures. I find bone dust and leaf mould the best for carnations. Set your plants 1 foot apart and 3 feet 6 inches between each row, driving in three 1-inch stakes round each plant and leaving 2 feet 6 inches out of the ground. This will allow you to keep the plants from trailing on the ground, which they are very apt to do if of a weak growth.

When your plant flowers, if it is a cross of your own and the flower continually bursts, throw it away, especially if it is a self colour, for bursting is a very serious defect in a flower, though I must admit that at certain periods almost all carnations have that tendency.

I do not think we have paid very much attention at our shows as to what is strictly a true carnation, a good number at every show having too much of the serrated edge of the Marguerite strain. It would not be a bad plan to have a separate class for this class of carnation, which would be a means of education to exhibitors. A true carnation should have perfectly smooth petals round the edges, without specks of any kind on the flower, and about six inner petals, one overlapping the other and gradually becoming fuller in the centre.

I do not wish any amateur to get mixed in any way by these remarks in regard to the outside petals being smooth, and so think I am confusing carnation with picotees. I am sure any person once seeing a picotee would know it again, as the picotee has a distinct marking all round the outside of the petals in the shape of a ring. The carnation is striped through each petal from centre to edge.

In growing carnations for exhibition, one must resort to disbudding, leaving only the crown bud on each shoot, and as soon as that appears start watering with weak liquid manure three or four times a week, shading from the hot sun. I find it an excellent plan if you wish to retain colour, &c., to grow your plants for exhibition in 8-inch pots, putting the pots in boxes, and filling up to the rim with sawdust. When the buds are about to open, take them out of the box and put the pot in the bushhouse. By so doing you retain the colour, and the flower will last much longer, as the bees and insects will not trouble them there.

In regard to exhibitions, I would like to suggest that more classes should be added to the schedule, which would, I think, induce more amateurs to take up the cultivation of this flower even in preference to the rose, &c.

I have no doubt a good many growers find that, during the months of February and March, their plants die off suddenly one after the other. This is caused principally from bad drainage, or by excessive watering, or heavy rain followed next day with great heat, which causes scalding, the water not being able to get away quickly, the sun's rays make the wet soil so hot that it scalds the bark, which make the plants die off very quickly. If you have no way of draining, you must find some means whereby to protect the stem of the plant from the sun's rays. I can only suggest one way, which would be likely to prove successful, and that is, to get some 3-inch agricultural pipes, and with an old saw cut them into two parts, and, when planting the young carnation, place this over it. By so doing, it is impossible for the sun's rays to get near the stem of the plant. I have had carnations growing by this method whilst all round in the same bed I have lost dozens. In watering, I would strongly advise any who have got a fair fall to their land not to water on the surface in the summer months, as unless you thoroughly soak the ground the watering is practically of little benefit, but to allow the water to gradually filter through. This can be achieved by making a small trench a few inches deep at the highest part, and allowing this to be kept filled with water.

In propagating carnations, one takes off the side shoots or cuttings; the present month being as good as any for that purpose. After cutting these off at the back of a joint, all that is needed is to plant them in a compost principally of sand and you will find them take readily enough. In propagating from layers you will require to cut about half way through at the back of a joint and fasten down with a peg to keep the branch firm.

The carnation, like all plants, has its disease, such as green fly, thrips, wire-worm, and a disease called *Uromyus Caryophyllinus*. The latter is the worst of all; it makes its appearance on the leaves in the shape of brown spots. Whether it is prevalent in our State I cannot say; I certainly hope not.

The carnation for exhibition purposes is classified into seven or eight classes:—

1. Scarlet brizzares (stripes of maroon and white on each petal).
2. Crimson brizzares (stripes with bright purplish crimson with a white ground).
3. Pink and purple brizzares (pink, purple, and white).
4. Purple flakes (purple on a white ground).
5. Scarlet flakes (scarlet stripes).
6. Rose flakes (rosy pink shades on a white ground).
7. Self (one colour).

In regard to selfs, I would like any member to tell me if he knows of a good yellow. I have grown one or two, but they are either very poor bloomers or growers, and I have not succeeded in raising a good yellow myself. Why we are so short of this colour, I do not know, as yellows were known in England in 1599. Here is a chance for some of our amateurs to make a name for himself, for I am sure if a good pure yellow were only raised, there would be a great many inquiries for it, we being very short of that colour.

The following is a list of a few of our best Queensland raised varieties, which are in commerce:—

E. Grimley.—Delicator, Tiger, Robert Ward (stripes).

C. A. Smith.—Victor, Nigger, Hindoo Improved (dark).

Sylvia, Nellie Peters, Pink Perfection, Miss Alice (pink).

Variables (peach).

Sunrise (bright red).

President Kruger (red).

Mrs. Proudfoot (improved).

White Clipper, Bailey's White, Purity (white).

I have not named a list of carnations raised out of Queensland. Any member wishing to get a list should write to Mr. J. Douglas, of England, whose collection is regarded as second to none, comprising as it does several hundred varieties.

In conclusion, I would like to state that in giving my paper, I have done so with the express object of gaining information in the discussion which I hope will follow, as I do not lay claim in any way to be more than a fairly successful raiser of these flowers.

OLD AND NEW WART CURES.

In medicine, as in other matters (says the *Australian Field*), we are constantly reminded of Solomon's *obiter dictum* that "there is nothing new under the sun." Salycilic acid is said to be a new remedy for warts; but the rubbing of warts with a peeled willow stick or wand is about as old as the first Chinese dynasty. It is from the inner bark of the willow that salycilic acid is made, and this preparation in rather large doses will get rid of warts situated in places where it is dangerous to apply caustics, and where ligatures cannot be employed. One or two drachms daily have been given to cattle afflicted with warts inside the mucous passages, with the result that they have disappeared.

The blood cure for warts is probably as old as the fig poultice of Hezekiah, but dropped out of use, as massage has for some hundreds of years, to be reintroduced a few years ago, abused, and laid aside again. True, we are provided with a new explanation as to how blood acts as a wart curer. It is said that the blood contracts so firmly upon the warts as to strangle them, provided it is applied quite warm, and therefore in its liquid state. One need be near a slaughter-house to carry out the treatment, or else bleed some animal daily, and the latter course does not commend itself to our feelings in this age. The rediscovery of blood as a wart cure took place through a dog, whose mouth was filled with myriads of warts, being left with a butcher. The animal, of course, visited the slaughter-house, with a view to snapping up unconsidered trifles, and while there acquired a taste for hot blood. When the owner came again to claim him a very short time after, nearly all the warts had gone and the rest were turned brown and were ready to fall off. If situated near a slaughterer's, it is certainly worth while to try the blood cure on pregnant cows whose teats are covered with warts, and may not be treated by any of the ordinary remedies.

Viticulture.

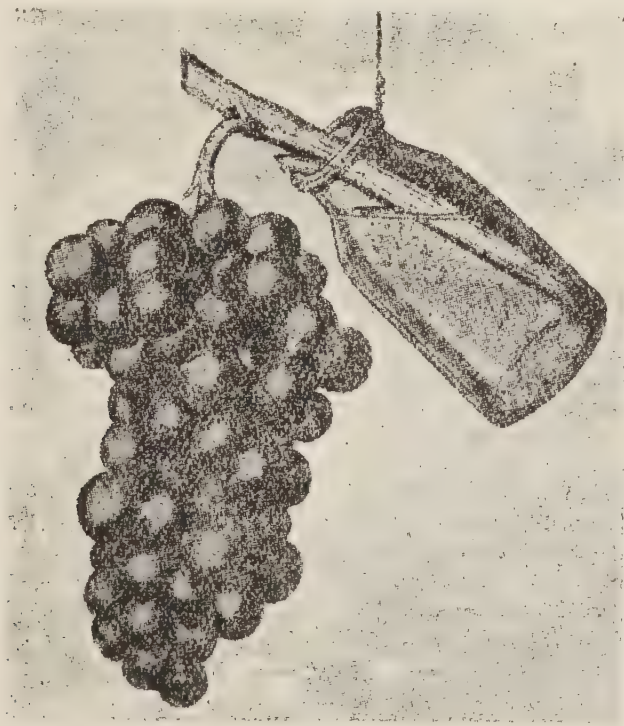
PRESERVING GRAPES IN BOTTLES.

Edwin Molyneux, in his work, "Grape Growing for Amateurs" (Upcott Gill), says:—

"Grapes can be preserved for five months after being cut from the vine by bottling them, and, indeed, I have seen bunches of Lady Downs kept quite fresh and fit for exhibition after being in bottle for eight months.

"Before bottling, the grapes must be perfectly ripened, as the skin of the berries is then tougher and less likely to decay afterwards. The best varieties for keeping are Lady Downs, Alicante, Gros Colman, Alnwick Seedling, and Muscat of Alexandria."

It is not necessary to have a grape room erected for the purpose of storing bottled grapes only, as they can be kept very well in any suitable room; thorough dryness, darkness, and an equable temperature of, say 40 degrees to 45 degrees being essential, though perhaps it is not absolutely necessary for the room to be thoroughly darkened as the grapes will keep quite fresh in an ordinary room. If, however, a room is set apart for them it will be better if it is darkened and kept close at the temperature named. The great mischief to guard against is damp, although fire-heat is bad for the keeping of the fruit; and if the room is dry and can be kept at the right temperature without having recourse to artificial means, so much the better. Where a large number of bunches have to be dealt with it is necessary to have properly constructed racks with bottles to correspond, these latter being short with wide necks; but in the case of the amateur with but a few bunches, perhaps any ordinary wine bottle will suffice, and this can easily be hung up to a nail in the rafters of the roof, or elsewhere. If a piece of wire be fastened round the neck of the bottle (which should be filled with clean water) the weight of the bunch will balance the bottle when hung up, and in this way the grapes will hang clear of the bottle, as here illustrated.



Three to six inches of stem should be allowed to each shoot below the bunch, according to the distance of the bunch from the main rod. In cutting the stem upon which the bunch is borne, care should be taken not to interfere

with the eye nearest the stem of the vine, as these are intended to be left in pruning to give the next season's crop of fruit. This is the only point to be considered in determining the length of stem to cut in preparing for bottling the grapes. Where a choice of length of the shoots can be had, and the bottles in which the grapes are to be placed are not of a uniform size—and they need not be—it is better to allow 1 foot of stem in some instances, because it will be found that if the stem reaches to the bottom of the bottle the bunches will balance better when the bottles are suspended from the neck. That really is the main point to consider. A small quantity—say, one teaspoonful—of not too finely powdered charcoal in each bottle of water will assist in keeping the water sweet for the bunches that are intended to hang the longest; but for hanging say one month or so, this is not necessary.

When the bunches are cut, they should be carefully examined, to see that there are no decayed berries in the centre, and if there are any, they should be at once removed, or the berries nearest to them will decay also. Indeed, this point should not be lost sight of afterwards, and the bunches should be examined every week; for it is surprising how quickly one decaying berry will taint all those around it.

After the bunches have been cut about two days, more water must be added to that in the bottles, as the stems will have absorbed a quantity, and any of these which were short may be quite dry on account of the absorption; but if the bottles be once again filled up after a lapse of two or three days, no more will be required afterwards.

The stems above the bunches should be left intact, as the berries are not then so liable to shrivel. Sometimes it is necessary to remove the point of the shoot, or even to place the stem in the water above the bunch, in consequence of the bunch being situated near to the stem or in an otherwise peculiar position. In that case, these bunches should be used first, as they are more likely to shrivel than those which have their shoots intact.

DESTROYING RABBITS IN BURROWS.

Kerosene and Sulphur.—Saturate a piece of old bagging about 6 inches square with kerosene, sprinkle on it one tablespoonful of ordinary sulphur, place in burrow, light with a lucifer match, and push the rag as far down as possible.

Bisulphide of Carbon.—1. Saturate a piece of cotton wool or waste with bisulphide of carbon, and force it into the burrow, closing the entrance at once. 2. Dissolve two sticks of phosphorus in a little less than $1\frac{1}{4}$ pints of bisulphide of carbon in a bottle; add half-a-pint of water, and close. Carry the bottle carefully, and do not shake roughly. Catch a rabbit, attach to its leg a rabbit skin saturated with about two wineglassfuls of the mixture. Let the rabbit go in the burrow. The skin will soon break into a blaze, the smoke coming out in thick volumes from any unclosed outlet. In a little while send down another rabbit from a separate entrance, and an explosion will result, killing all the rabbits in the burrow. This cannot be safely done where there is dry grass or other inflammable matter near the burrows, and the greatest care must be taken that the rabbit does not escape, as it would carry the fire in all directions. 3. Saturate cotton waste with bisulphide, and push it as far down the burrow as possible. After it has remained a few minutes, some people push down a stick on which is a piece of lighted oiled waste into the burrow, when the fumes of bisulphide explode, and it is said this makes it more effective; but there is danger in the practice.

It is, of course, necessary when dealing with the rabbits in the burrows that all but the openings to be operated on be first closed, in order to prevent the escape of the rabbits or the fumes. If the surrounding country can be first hunted well with dogs, more success will be attained, as the rabbits will seek shelter in the burrows.—*Journal of Agriculture, S.A.*

Botany.

A NEW BANANA IN THE CONGO FREE STATE.

[From the *Revue des Cultures Coloniales*.]

In the February number of the above journal, Mr. E. De Wildeman, Curator of the Botanical Gardens at Brussels, gives the following description of a new series of banana which was discovered by Mr. J. Dybowski, Director of the Colonial Garden at Nogent-sur-Marne, during his travels in the Congo country, of which he had neither seen the flowers nor fruit. Subsequently to his last voyage some fruits were received, of which the seeds were sown, and produced young plants at Nogent, and it is from these that Mr. Dybowski has given a summarised description of the "fetish banana" (*Musa religiosa*).

Although we have not been able to study the description of flowers, we immediately recognised that the plant from French Congo had a great resemblance to those we propose to describe here. Mr. Dybowski has been good enough to forward, at our request, specimens of the seeds and a fragment of the fruit of his *Musa religiosa*, but these are not sufficient to enable us to definitely solve the question whether *M. religiosa* and *M. Gilletii* are two specific types.

We might give as a distinctive characteristic the colour of the seeds, which are grey and dull in the former, whilst in the latter species they are of a beautiful brilliant black; as regards the measurement, they are about equal. In consideration of this difference, and in the complete absence of information as to the flower, we have preferred to describe our plant under a new name, and to dedicate it to our collaborator, J. Gillet, S.J., who devotes a large portion of his time to the collecting of the plants of the Lower Congo. Besides, this plant will shortly make its appearance commercially, for the seeds sent by J. Gillet to the Messrs. Damann, of San Giovanni, at Teduccio (Italy), have germinated and produced young plants.

MUSA GILLETII, *De Wild*, a new species. Plant, 1 metre 50 to 2 metres high (4 feet 9 inches to 6 feet 4 inches), not stoloniferous, more or less swelled at the base, completing its cycle of evolution in three years; during the first year, the plant is low, and has few leaves; in the second year it makes height growth still, foliated from the base; in the third year there is formed at the extremity of the stem, which bends over, a floral panicle. The lower leaves are elliptical lanceolate, with a very strong sheathed petiole, and with a very large and pronounced midrib. They are 1 metre 50 (57 inches) long, and have a translucent border. The upper leaves are 40 to 50 centimetres long (16 to 20 inches), those nearest to the inflorescence only attain to about 8 inches, and pass insensibly to the bracts; these become gradually narrowed as they reach the inflorescence; leaves and bracts are terminated by a narrow twisted elongated apex. The floriferous spike, shortly pedunculated, recurved, measures about 40 centimetres (16 inches) in length, not including the peduncle, and is formed of numerous persistent bracts, of which the ten or twelve inferior ones alone enclose the fertile flowers. The flowers situated at the seat of the superior bracts are male. The bracts are oval-lanceolate, more or less elongated, and are from 4 to 5 and 9 centimetres ($1\frac{3}{5}$, 2, and $3\frac{3}{5}$ inches) broad, and 17 to 25 centimetres ($6\frac{4}{5}$ to 10 inches) long, more or less acute at the top. The flowers are arranged in two rows, to the number of ten or twelve; five or six in the inside row, five on the outside. The perianth has two lips, the smaller

enclosed at the base by the larger; the first tridentated at the top, and longitudinally mucronated, about $\frac{2}{5}$ inches in length, not including the prolongation; the longer caniculated, trilobed at the top, from 2 to 3 centimetres ($\frac{4}{5}$ to $1\frac{1}{5}$ inches) long with lobes sometimes 4 millimetres ($\frac{4}{5}$ inch) long, sub-obtuse or sub-acute at the top. Stamens to the number of six as long as the exterior lobe of the perianth, one of them often more or less abortive with slender pedicels, with 2-celled anthers, about 12 millimetres ($\frac{1}{2}\frac{2}{5}$ inch) long, obtuse at the top, fixed at the top of the pedicel, attached in their whole length to the connective; pollen grains globular or sub-globular with a thick external wall showing grains at intervals. Inferior ovary, trilobulate, with numerous ovules, of 2-series, with elongated style as long as the stamens, exceeding them slightly, terminated in a claviform stigma, irregularly lobed. Fruit oblong, angular, sub-pyriform, attenuated, to a sort of pedicel at the base, shiny, greyish exteriorly, irregularly tuberculate in consequence of the protuberance of the seed crowned by the base of the lobes of the persisteal perianth, enclosing about twenty-three seeds, and measuring about $5\frac{1}{2}$ centimetres ($2\frac{1}{2}$ inches) long by $2\frac{1}{2}$ centimetres (1 inch) broad towards the end. Seed enclosed in a pulp which becomes pulverous and white in a dry state, ovoid-angular through mutual pressure 8 millimetres (about 4 lines) high by $\frac{6}{10}$ millimetres (about $\frac{3}{4}$ line) broad, the attaching cicatrice 3 millimetres ($\frac{3}{5}$ inch) in diameter, of a beautiful shiny, black colour, limp, furnished at the top with a little punctiform depression surrounded with a slightly obtruding border. Habitat: Borders of the ravines in the region from Kisautu to Luvituku, the two extreme points of the Lower Congo, where up to the present it has been observed (J. Gillet, 1900).

From what we have said above, it would appear clear that Gillet's plant belongs to the group of *Musa Ensete*, Gmel., and that, therefore, belongs to the sub-genus *Physocaulis*, Baker (1), which includes only six species in tropical Africa and eleven in the whole world. From the size of the seed it approaches *Musa Livingstonia* and *proboscidea*, but in the first of these, instead of being smooth, they are tuberculous, and as regards *M. proboscidea*, the height of the plant (four or five times as tall as a man) and the length of the inflorescence are sufficient to show that it is widely distinct from the former.

THE WATER HYACINTH.

If anything could emphasise our repeated warnings against the planting of the beautiful but pernicious water hyacinth in the freshwater lagoons and creeks of the State, it would be the spectacle witnessed in the Brisbane River during the last week of March. The plant was introduced in the same way as the lantana, *Sida retusa*, cobbler's peg, Johnstone grass, nut grass, and other blessings, either as a curious exotic to be carefully cherished, or, as in the case of mustard, wild oats, swamp couch, mixed with other imported seeds. At the time of its introduction few people in Australia had any knowledge of the disastrous effect of its spread in the United States. If they will look at the May, 1899, number of *Pearson's Magazine*, they will then be able to form some idea of the loss and expense to which the people of Florida are subjected owing to the presence of the plant which we have heard called "The beautiful lilac devil." It first appeared in 1889. It soon choked out the water-lily, the wild celery, and all other aquatic plants. It has seized both banks of the river (St. John's), and floats in large compact masses on the surface, swinging backwards and forwards with the tide, which runs more than 100 miles up the river. Villages and towns on sluggish streams emptying into the St. John's are sometimes isolated for weeks and months, as no vessels can approach them. Often bridges are carried away by the pressure of the tangled masses of hyacinth. Boats and even steamers become helpless in it. Sawmills have had to cease work, as logs could not be towed to the mills, or sawn timber be got away. All net fishing is

destroyed. Lake George, 19 miles long and 12 miles wide, is entirely covered by it. Yankee ingenuity has not been able to suppress the nuisance, yet hundreds of thousands of dollars are annually spent in forming water-ways through it. Few uses have been found for it. As a fertiliser it is almost valueless. Cows and pigs will eat it, and this ends the tale of its value. Much hope was built in Florida on the work of a certain red spider which appeared on the plant, but the insect did not multiply fast enough to effect any good result. Now, that red spider might do good work in Queensland. Florida has very cold winters—big freezes—and possibly the spiders love the warm summer. Hence, in sunny Queensland they might multiply exceedingly all the year round.

To return, however, to the Brisbane River. During the week named there was a considerable fresh in the river, and vast masses of the hyacinth broke adrift from the Brisbane and Bremer Rivers, near Ipswich, 50 miles away from the metropolis, and came careering down the river in large rafts. Vessels lying at the Brisbane wharves were surrounded by it. Small steamers picked it up on their propellers. The ferryboats at one spot ceased running. The high tide, aided by the fresh, left quantities of the plant stranded above high water-wash, where it has already taken root. Numbers of people, ignorant of its habit, have carried off baskets full of the pretty plant to set it in their waterholes and gardens. We are glad to see that the Brisbane Press has pointed out the great danger of propagating the hyacinth. A single root thrown into a waterhole will choke it up in a month. Cattle will carry it away on their hoof and horns to other holes, and so the evil will be perpetuated, until the time will come when the municipal and rural authorities will find it necessary to raise funds, not for roadmaking, but for the destruction, or rather attempted destruction, of the water hyacinth. No attempts at its destruction have ever succeeded in Florida, and the small attempts in Queensland have not as yet resulted satisfactorily. So serious is this question of the water hyacinth that we have no hesitation in giving it as our opinion that the planting of the pest in any waterhole, or in any spot outside a kerosene tin or some such receptacle, should be regarded as a punishable offence. We need only imagine the results of the Condamine, Maranoa, Warrego, or any of our Western rivers being choked with the weed, to warn us against its introduction into these rivers.

For illustrations, views, and notes of the water hyacinth in Queensland, see *Queensland Agricultural Journal*, Vol. I., p. 252; Vol. II., p. 420; Vol. VI., p. 497; Vol. VII., p. 156.

A NON-SWARMING HIVE.

“Bee” in the *Farmer and Stockbreeder* writes:—What is this big Birmingham non-swarming hive? I assure you that it is a good hive, made more costly by a few shillings added because of its very attractive name. Big hives require more thought, skill, and hard work if they are to be worked properly than do the ordinary ten-framed hive in most general use. Uniting may take place as soon as the weather will permit of hives being opened without danger to the brood. As both lots are to go into this big hive to give a big start, first of all move the two stocks about a yard near daily, but not till the bees begin to fly about. As soon as they are close together choose a warm day for uniting, subdue them with smoke or the carbolic cloth, and then make them of one scent by sprinkling them with syrup scented with peppermint; or, better still, scatter over them a fine cloud of pea flour. Then lift out a frame from one hive and then from the other, so that when all are in they are thoroughly mixed. Remove the old hives and leave the united party to settle down till in a few day’s time an ordinary examination of the frames can take place.

Tropical Industries.

FOXY COFFEE.

IN our last issue we published a most interesting article on "Foxiness in Coffee," by Mr. H. Newport, Instructor in Coffee Culture for this State. The following article on the same subject appeared in a late number of the *Tropical Agriculturist*, Ceylon, and fully endorses the remarks of Mr. Newport. The article is addressed to the editor of the *Planting Opinion*, and reads as follows:—

To Editor *Planting Opinion*.

SIR,—With reference to Mr. P. G. Tipping's query *re* "Foxy Coffee" in your impression of the 5th instant, I think he will find the following information of some use. Speaking on the subject at the U.P.A.S.I. meeting in 1899, Mr. Graham Anderson, C.I.E., said: This term ("foxy") denotes a reddy-brown appearance of the seed caused by the adhesion of the silver skin into which the colouring matter contained in the outer skin and fruity portion of the cherry has infiltrated. *This appearance is undoubted evidence of the fruit having been picked when quite ripe* (italics mine); and nearly all really good, cherry-dried coffee, which is so highly esteemed in France, is thus indelibly marked. The quality of the coffee is in no way injured, the stain being superficial and confined to the silver skin, which can easily be scraped off with a penknife. If roasted carefully, the aroma will be found excellent, which is another proof of maturity. If a quantity of ripe coffee fruit is heaped or kept in a cistern, fermentation will take place, and the red colouring of the skin and fruity portions will sink into the gummy substance surrounding the "parchment," precisely in the same way that analine ink penetrates the gelatine slab used for copying letters. If prompt measures are not adopted, not only will the parchment be permanently discoloured, but the silver skin below will be stained and firmly gummed on to the seed. If observed in time, the remedy consists of getting the fruit pulped as soon as possible; in closely watching the subsequent fermentation, and having the parchment thoroughly washed as soon as the gum has changed into a state in which it can be acted upon by water. In warm, rainy weather similar changes occur in very ripe cherry before it is picked from the trees. Some pulpers do not work satisfactorily and allow a large quantity of skins and half-pulped cherry to pass into the cistern along with the parchment. If these are not properly separated before fermentation takes place, the seeds they contain will be more or less foxy. The ripest, richest, and most succulent fruit is always the first to suffer in this way, or from any delay occurring in "picking, pulping, or preparation."

Last season, in his desire to enhance the quality of his coffee, a proprietor hereabouts allowed his coffee to get dead, or purple, ripe on the trees before picking it, and, to his thundering surprise, it was reported on from the Coast as foxy. Now, his coffee had never before been reported on as foxy. His surprise was even greater when he was told that the "foxiness" had probably been produced by his allowing the fruit to become over-ripe on the trees before gathering it. On the other hand, on a neighbouring estate, the coffee, which had previously to last season been nearly always pronounced foxy, was that season singularly free of "foxiness." This was attributed to a uniformity of shade over the place which seems to have been attained for the first time in 1898-99; but the "trick" seems to have been done by washing the coffee twelve hours after pulping it, the pulphouse having a position facing south-west, and the aspect of the estate being throughout nearly the same.

The obvious precautions which suggest themselves from the foregoing are—

- (1) To avoid, as far as possible, allowing the berries to become dead, or purple, ripe on the trees. They should be picked as uniformly red-ripe as possible. A spot of green on the outside pulp will make no difference, the bean being nearly always matured before the pericarp has been fully coloured.
- (2) To pulp the coffee as soon after taking in as possible. The operations of pulping and measuring might go on simultaneously. Some power more expeditious than cattle-power is desirable in this connection.
- (3) To pulp as cleanly as possible. If pulpers are not working satisfactorily, this must be done with the aid of a sieve, the skins and half-pulped cherry being passed through the pulpers a second time.
- (4) To wash the coffee as soon as the mucilage is ready to be acted on by water. This can be determined by experiment. For the rest, trust in Providence. I trust that this small contribution on the question will promote a healthy discussion which will lead to the elucidation of a subject which there is no gainsaying is of great importance to the planting industry.

H.G.R.

COFFEE CULTURE IN QUEENSLAND.

No. 8.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

PITTING, FILLING-IN, PLANTING, AND SHADING.

Pitting and holing for coffee should be carried out during the preliminary showers of the rainy season. Generally the weather will be favourable during January, but, even if dry, unless the hardness of the soil makes the cost prohibitive, an effort should be made to complete the work before the regular and heavy rains set in, so as not to delay the planting.

The object of pitting is primarily to allow the taproot of the delicate young plant to have a free and unobstructed start in its downward course, and secondly to give the same fair start to the lateral roots, and is not essentially, as many think (especially coffee planters of the old school), to give the seedlings richer or better soil to start in. This is, in fact, a dangerous error, as will be shown later.

The shape of the pits may be either round, that is, cylindrical, or square—cubical. The cubic pits of the same diameter give more room for the plants than the cylindrical, but there is not very much difference, and the cylindrical form, being easier, is more generally adopted.

Pits should not be either too wide or too deep, because the soil filled into such becomes hard, even harder than before from its fineness, before the plant can take advantage of it, on the one hand, and because of the expense on the other. The size of pit necessary for coffee has been found to be from $1\frac{1}{2}$ to 2 feet according to the soil; 18 inches by 18 inches is as small as is allowable with benefit to the plant, and 2 feet by 2 feet as large as it will pay to make, under ordinary circumstances; 2 feet deep by $1\frac{1}{2}$ feet wide is a good size of pit for coffee. The bottom need not be as wide as the top, as the lateral roots do not go lower than 1 foot from the surface, but in 18-inch cube pits very little is gained by making the lower 6 inches narrower than the top foot. When finished the bottom of a pit should always be broken up with the holing bar to prevent the formation of a pan as well as to see if any large stone or root exists just below, in the latter case it should be removed. Pits that are too shallow are the cause of many failures in clearings. The young taproot should

not be required to start off into unturned and more or less hard subsoil at once on being put out—a few inches of soil that has had anything that might prove an impediment to the taproot removed will admit of a stronger and healthier root to work its way down afterwards, while if the root is put straight away at the bottom of the pit, especially in a young plant from a nursery bed and possibly after being cut back, the end of the root is very apt to turn upwards. For the effect of this and results, see article on “Coffee Root Growths,” *Queensland Agricultural Journal*, March, 1900, p. 214.

The width of pits may be reduced, but never the depth, for it must be borne in mind that the width of the pit can be remedied at any time—the depth, never. Should it be found, therefore, that, the planting season coming on, there is no time to complete the pitting of the clearing with pits of a proper size, the work may be expedited or cheapened by the digging of narrower pits. Coffee may be planted in post holes, provided only the depth is kept to, with perfect success, the width being made up to the plant again during the year when time admits. It must not be imagined that narrow pits are on this account generally advisable. On the other hand, it is far better to pit at once to the full size.

By contract, pits should not cost more than 1d. to 2d. each—that is, a labourer should be able to do so from thirty to sixty pits a day, according to size, condition of the soil, and the presence or absence of stones, roots, or gravel.

In the old days of coffee planting, and occasionally even now, plants are put out without pits by a method called “dibbling.” This consists of sticking a holing bar or stake into the ground for a foot or so, and working it about until a small hole is made, into which the plant is put. Of course, the plant can have no earth round the roots when planted thus. Sometimes several holes are made in this way and broken into one, but the dibbled hole, while making a way for the taproot, hardens and cakes the soil around the lateral roots. This method is in advance of one I have seen adopted in this State, which consists of making a small hole with a hoe, only a few inches deep, into which the plant with its earth is seated, and the earth trodden hard round it. In this way the taproot must inevitably be bent. Another method, much used on the Continent in forestry, is to make two cuts crossing each other in the earth with a spade, as deep as possible, and then with a third insertion, somewhat to one side, gently prizing up the soil or sod. The earth cracks naturally at the cuts, and the plant is inserted at the point where the two cuts intersect, and the sod gently pressed back. This eliminates the hardening or caking of the soil for the lateral roots, but does not afford the plant any assistance in the way of removing obstructions. Under given circumstances, and in specially favourable soils, pitting might be dispensed with, especially if, as in forestry, a hardy indigenous tree is to be planted; but generally in the planting out of more or less delicate exotic trees such as coffee, any method that does away with the pitting is uncertain, dangerous, and to be deprecated.

The pits once dug should be left open for a time, if possible, until after a good shower of rain, so that not only the sides and bottom of the pit, but the earth excavated may be sweetened and rendered fertile by sun, air, and weather.

Filling In.—The filling in of the coffee pits is one of the most important works in coffee culture. It is often carelessly and badly done; yet the health and strength, and often the very life, of the young tree depend on the start it gets in the field. Like shallow pitting, or bad planting, filling in, once badly done, can never be remedied. The filling in of pits should never be left till the planting time arrives, but be done in good time. Not only should showers be waited for after filling in, if possible, to allow of settling, but the filling in also should be done after a shower, when the soil is uniformly moist. The soil should be put back into the pit in much the same order that it came out. It is a mistake to fill a pit that goes down into a subsoil at least poorer than the surface soil with a rich surface mould or manure. This, though often done

and frequently advocated, leads to a drawing downwards of the lateral roots to the plant's subsequent detriment, and the too quick growth of the taproot which is rendered more delicate rather than hardy. A quick and apparently healthy growth for a year or two is the immediate result, but eventually the check received by both taproot and lateral roots, when the growth requires them to spread beyond the "pot" that the original pit has thus become, will result in a marked fall off in the third year, a speedy drooping in dry weather, and often in a plant that dies in bearing its maiden crop.

The first thing to do in filling in is to remove roughly with the hoe, yet as carefully as possible, all roots, stones the size of a walnut or upwards,* and weeds or rubbish, break all lumps and lightly mix the soil taken out of the pit; then to put it in again after having seen that no stones, sticks or rubbish have fallen into the pit itself. The use of a sieve or screen ensures good filling, but is slow, expensive and unnecessary.

The breaking in of the sides of the pit is unnecessary, and often causes a wide hollow round the tree. The scraping in of surface soil is also to be avoided, as either ashes and roots are filled into the pit, or grubs and insects collected which attack the plant as soon as it arrives. If the earth is not sufficient to fill the pit and heap it over, a shovelful or two of earth from between four pits may be taken to complete it. The pits must be carefully *filled*; it is of no use digging pits if they are only partially filled again. The earth should not be pressed down but heaped up over the pit and allowed to settle naturally, which it will quickly do after a shower of rain. The stake used previously in lining should then be stuck in the heap to indicate the centre of the pit, the edges of which will not be visible, and to prevent the plant from being put anywhere but in the middle of the pit. A very frequent mistake that is made is to fill, or almost fill, the pit with ashes, under the impression that ashes are a valuable manurial agent. Ashes *are* valuable. Wood ashes consist very largely of potash, among other valuable ingredients, which is one of the constituents of the coffee tree, but the young plant requires it diluted, and in small quantities. In large and unmixed quantities the roots cannot make headway, get stunted or worse, and the plant will not grow. The effect of too much wood ash at the roots of the plant is to encourage and often cause fungoid growth, moss, &c., on the stem, and a stunted and sickly appearance, while nothing can be seen wrong with the roots except that they have not made the growth that they should have made. In moist or cold soils a chemical reaction sets in, which burns the tip of the taproot, and often the lateral roots also. In clayey soils the excess of ashes is often evidenced by a growth of small yellow fungus on the ground round the stem of the tree, and occasionally I have observed minute beads of crude saltpetre.

Trees having yellow, striped, or variegated leaves, indicating an excess of potash or insufficiency of nitrogen, often show where wood ash in excess has been scraped into the pit. Later on, a growth of rank grass or coarse weeds of a deep green colour will appear on the pit. A little—very little—wood ash mixed in with the soil, especially with a little charcoal, will do no harm; but in *excess* wood ash, at this stage of the life of the coffee-plant, is disastrous.

The cutting out of plants from the nursery bed and their selection has been dealt with in the article on "The Nursery" (*Queensland Agricultural Journal*, February 1900, p. 120). An instrument called a transplanter is sometimes used for the cutting out of plants from the nursery beds, and a short description of it here may be useful.

The transplanter, for which there are, I believe, several patents in England, India, and Ceylon, is very like an ordinary spade with the blade bent round until the edges nearly meet, forming a cylinder except for a gap of about three-quarters of an inch in width. There is then a sort of lid to the cylinder having a "U-shaped" gap in it (where the stem of the plant goes), movable, and fastened to the spade by means of a small iron rod. This lid is moved up and

* *Vide Queensland Agricultural Journal*, March, 1900, p. 214—"Root Growth of Coffee Plants."

down the length of the cylinder, inside it, by means of a small handle at the end of the iron rod which works in two small staples in the spade-like handle of the transplanter. The instrument is about 3 inches wide at the cylinder, and being put over the plant in the bed is pressed down with the foot as a spade, the plant levered out with its ball of earth, and the lid, moved by the small handle, then pushes the plant out of the cylinder on to the tray or barrow in which the plants are transported to the field. This transplanter can be used for many other small plants, and is very useful, saving time and trouble where large quantities have to be dealt with.

In taking plants to the field, care must be taken first to preserve intact, if possible, the ball or brick of earth, and second to shade from direct sunlight. A few leaves of banana or castor-oil over the plants will be sufficient, but a few moments of sunshine will often wither them and give them a check which it is the planter's object to avoid. The plants may then either be placed one against each heap of earth covering the pits, or be kept in the tray or barrow and taken out as required when planting. If raining at the time, it may be just as well to keep the plants together and covered to prevent the breaking or washing of the ball of earth. The plants should be carefully selected as pointed out previously. Re-lining after filling in, as is sometimes done to get the stakes in perfect line, is to be deprecated. If a pit is not dug in line no advantage is gained by putting the plant in one corner of it, but rather the reverse. If there is any doubt of the heap of earth being in the middle of the pit, the edges of the latter may be felt for with the stake, and the centre then determined at the time of planting.

Planting.—Planting should be done as early in the season as practicable, to get as much of Nature's watering for the plant as possible. The artificial watering of even an acre is expensive, and of large areas is out of the question. Enough rain should have fallen to moisten all the soil in the pits before planting is commenced, as well as to allow of natural sinking of the new earth. If the soil in the pits on being turned over be dry in parts, wait for more rain. If possible, plant on a cloudy day or while drizzling, but not when the ground is sloppy or the soil clinging and muddy.

The plants being then brought out to the field the heap of earth should be roughly levelled off and a small hole, a little deeper than the ball or brick of earth on the plant, dug in the soft earth with the hand, a stake, or trowel. This little pit should be sloped towards the planter, but have the side away from him perpendicular. The plant is then taken, with the ball of earth lying in the palm of one hand and the stem of the plant on the wrist or forearm, and held against the perpendicular side of the little excavation, while the earth is gently pressed *under* and on the other three sides of the ball of earth, the hand that was holding it being gently withdrawn. The earth is then again gently pressed in with the finger tips, and the edges of the pit pressed gently with the feet, the spare soil being levelled round the plant.

Another way is, while holding the handle of a hoe close to the ground, to press the blade into the earth about the middle of the pit and pull for 6 or 7 inches towards you, proceeding subsequently as before, but removing the hoe before returning the earth.

The plants should be put in level and upright. If they have been properly cut from the nursery bed there will be no fear of the taproot being bent. If the earth has fallen away care must be taken to see that the taproot is straight.

If planted too deep, the lateral roots already made become useless, and new roots have to grow from the stem; if too high, the lateral roots are also lost by exposure, sooner or later, and the plant's growth is checked in either case until these roots are replaced.

The top of the pit, again, should be level with the surrounding ground, for if left higher, it will wash level in the first heavy shower and the plant's roots will be exposed, or if a hollow or depression is left, water is collected there, which either rots the roots, ringbarks the stem, or "boils" the plant in the first burst of sunshine.

The stake should then be put in alongside the plant. If on sloping ground, above it; if on level ground, on the windward side, partly as a guard against rolling stones, or twigs and leaves blown along, and partly as a guide for the supply in case of failure.

Shading.—Unless the cloudiness of the weather is very reliable, shading should be done. Where bracken fern is available, this is easily collected and manipulated; if not, any green stuff with a fairly stiff stalk to it will do. Two or three pieces should be stuck in at the edge of the pit, bent over the plant, and interlaced with each other so as to stay in that position.

Except in an especially exposed situation, it is only the vertical sunshine that has to be guarded against. Before planting, a bundle or two of such green stuff for shading should be cut and kept to hand. Dry material is not so good for shading, and the putting of a handful of straw or hay on top of the plant does more harm than good. Shading is quickly done, and the work is not so expensive as might appear. It is amply repaid. The growth of plants that have come through the planting-out process, and “struck” in the field without an intermediate droop, is rapid and gratifying.

COTTON-PLANTING.

With a cotton famine and its tremendous consequences to British trade and manufactures almost in sight, it is amazing how little is done to attempt to supplement supplies. With the exercise of a little energy and expenditure of some capital there is no reason why Manchester should not emancipate itself entirely from its present state of dependence on United States supplies, liable to be cut off at any moment. Cotton could be grown in the north of Brazil to clothe the whole world, and, if undertaken on a large and comprehensive scale, probably at a much cheaper rate. Labour is certainly far cheaper here than in the States, whilst the advantage of a depreciated currency in such a competition is likewise not to be despised. The cotton-growing States are, moreover, the most densely populated of the country, Alagoas coming second in this respect only to the Capital itself. A powerful association for the plantation of cotton in the Northern States could not fail to be as profitable to planters as advantageous to home manufacturers if properly undertaken, and deserves to be seriously considered.—*Brazilian Review*, 23rd October.

THE COTTON INDUSTRY OF THE UNITED STATES.

AN OPENING FOR QUEENSLAND.

By A. J. BOYD.

The world's cotton supply and cotton trade are subjects which deserve to be carefully considered by Queensland farmers. Many tropical countries are eagerly watching the progress of the industry in the greatest cotton-producing States of the world. The extension of cotton-raising in the United States was mainly caused by the ever-increasing demands of the British and Continental cotton mills. Then there has been in addition an enormous increase in the home (U.S.A.) demand.

During the last fifty-two years, from 1848 to 1899, that increase has been almost five-fold. The production has risen from less than 2,500,000 bales to over 11,250,000 bales. In 1871, 1,000,000 bales were consumed in the mills of the States. In 1899, this home consumption had risen to 3,632,000 bales. Cotton mills there have rapidly multiplied, especially in the Southern States, where they consumed 1,415,000 bales—that is, one-eighth, or 12½ per cent. of the total American crop.

The British mills in 1899 consumed 3,519,000 bales, the United States themselves used 3,553,000 bales, and on the Continent cotton spinners account for more than either of these countries.

The total production in all the American cotton-producing States in 1899 reached 11,256,000 bales, pretty well all accounted for as above. The production of foreign countries in competition with the United States in the production and exportation of cotton amounts to about one-third of the production of the world. Japan consumes practically the whole of the Chinese export—about 36,500,000 lb. In Central Asia, Russia has not yet grown sufficient cotton for the needs of her home industry. Two-thirds of the Persian crop is exported to India and Russia; the export amounts to about 10,000,000 lb.

While India exports about four-ninths and the United States about two-thirds of the cotton raised in those countries, Egypt practically exports all she grows, amounting to over 500,000,000 lb., 43 per cent. of which goes to Great Britain. In India there are some 16,000,000 acres under cotton, producing 3,300,000 bales in 1899. The following tables, showing the average cost of producing an acre of cotton in the United States and the cost of each item in the production of a 500-lb. bale of cotton, are interesting:—

AVERAGE COST OF PRODUCING AN ACRE OF COTTON.

				Dollars.		£	s.	d.
Rent	...	...	...	2.88	...	0	12	0
Ploughing	...	...	...	2.81	...	0	11	8½
Seed	...	...	...	0.21	...	0	0	10½
Planting seed	...	...	...	0.28	...	0	1	2
Fertilisers	...	...	...	1.30	...	0	5	5
Distributing fertilisers	...	...	...	0.16	...	0	0	8
Chopping and hoeing	...	...	...	1.31	...	0	5	5½
Picking	...	...	...	3.37	...	0	14	5½
Ginning and pressing	...	...	...	1.08	...	0	4	6
Bagging and ties	...	...	...	0.57	...	0	2	4½
Marketing	...	...	...	0.64	...	0	2	8
Repairing implements	...	...	...	0.40	...	0	1	8
Other expenses	...	...	...	0.41	...	0	1	8½
					...			
Total Cost	...	...	...	\$15.42	...	£3	4	8

The average yield per acre is 255.6 lb. of lint and 16 bushels of seed. Valuing the clean lint at 6.70 cents (37⁷/₁₀d.) per lb., and the seed at 11.9 cents (about 6d.) per bushel, the total return amounts to 19.03 dollars (£3 19 3½) per acre, leaving a net profit of 3.61 dollars (15s. 0½d.) per acre.*

COST OF EACH ITEM IN THE PRODUCTION OF A 500-LB. BALE OF COTTON.

				Dollars.		£	s.	d.
Rent	...	...	...	5.65	...	1	3	6½
Ploughing	...	...	...	5.50	...	1	2	11
Seed	...	...	...	0.40	...	0	1	8
Planting seed	...	...	...	0.55	...	0	2	3½
Fertilisers	...	...	...	2.55	...	0	10	7½
Distributing fertilisers	...	...	...	0.30	...	0	1	3
Chopping and hoeing	...	...	...	2.55	...	0	10	7½
Picking	...	...	...	6.60	...	1	7	6
Ginning and pressing	...	...	...	2.10	...	0	8	9
Bagging and ties	...	...	...	1.10	...	0	5	0
Marketing	...	...	...	1.25	...	0	5	2½
Repairing implements	...	...	...	0.80	...	0	3	4
Other expenses	...	...	...	0.80	...	0	3	4
					...			
Total	...	...	...	\$30.15	...	£6	5	7½

Thus the cost per lb. of cotton amounts to 3.06d.

* I am indebted for the figures and other information given above to the United States Bureau of Statistics, whence has been issued a valuable publication entitled "Cotton Trade of the United States and the World's Cotton Supply and Trade."

A similar calculation will show how cotton-growing would pay a planter in Queensland, supposing him to own his land and to grow gin, and market the cotton himself:—

AVERAGE COST OF PRODUCING AN ACRE OF COTTON IN QUEENSLAND.

	£	s.	d.
Ploughing	0	7	0
Harrowing	0	1	0
Seed	0	1	0
Planting seed	0	1	2
Fertilisers	0	5	0
Harrowing and clearing	0	4	0
Picking 1,000 lb. at $\frac{1}{2}$ d. per lb.	2	1	8
Ginning and pressing	1	0	10
Bale	0	2	6
Marketing	0	4	0
Repairing implements	0	2	0
Other expenses	0	2	0
	£4	12	2

Thus the approximate cost of producing and marketing the produce of 1 acre of cotton in Queensland reaches £4 12s. 2d., as against £3 4s. 8d. in the United States, a difference of £1 7s. 6d. The items seed and fertiliser may, however, be left out of the statement, as the land in East and West Moreton, on which heavy crops of cotton have been produced, is rich enough already, and after the first season farmers would have plenty of seed to exchange with each other.

The average yield of seed cotton per acre in Queensland has been 1,000 lb., which, when ginned, produced about 400 lb. of lint. and 600 lb. of seed.

Taking the price of cotton at 6d. per lb., we have—

	£	s.	d.
400 lb. cotton at 6d.	10	0	0
600 lb. seed at £4 10s. per ton	1	4	1
	£11	4	1
Less cost of production and marketing	4	12	2
Profit per acre	£6	11	11

If, instead of selling the seed, the oil were expressed, the 600 lb. would yield 10 gallons of crude oil, worth £1 0s. 7d., and the resulting oil cakes, if made from undecorticated seeds, would fetch £1 2s. 4d. The decorticated cake would bring £1 15s. 8d. The hulls which are removed before pressing may also be sold for cattle food.

Thus under favourable circumstances a profit of about £7 per acre may be made by the planter who owns his machinery.

But as circumstances are not always favourable to the farmer in consequence of climatic influences, insect pests, &c., it will be necessary to add 25 per cent., or £1 3s., to the cost of production, making it £5 15s. 2d., and reducing the profit to £5 8s. 11d. per acre.

In a previous article on this subject (*Queensland Agricultural Journal*, Vol. VII., page 542) I showed that the cost of producing an acre of maize is £1 11s. 8d., and that with a 40-bushel crop and maize selling at 2s. 3d. per bushel, the profit is £2 18s. 4d. per acre. The profit on cotton is therefore double that on maize.

I also pointed out that the farmer who merely grows his cotton, picks it at $\frac{1}{2}$ d. per lb. and sells it to the ginhouse owner, makes a profit of £3 2s. 2d. per acre, and if he picks the cotton himself with the help of his family, he keeps the cost of picking (£2 1s. 8d.) in the family, so that he would actually be getting a profit of £5 3s. 10d.

As I have shown on previous occasions, other nations are preparing to compete with the United States in cotton-growing. Russia is rapidly increasing her acreage under cotton in Asia. Germany is determined to enter upon the industry in her suitable colonies. In what is called "Latin" America—that is, in Mexico, Brazil, the Argentine, Peru, Chili—cotton-growing is spreading.

Here in Queensland we have all the conditions needed for a large production, yet we grow wheat in places wholly unsuited to that cereal, below the Range, producing in a good season an average of 20 bushels per acre, worth from £2 to £3, from which all the usual expenses have to be deducted. We grow maize yielding 40 bushels to the acre, worth from £4 to £6, less expenses, often amounting to £2 per acre. And all these lands are capable of producing a crop which will give twice the profit of wheat and maize.

The cotton industry surely deserves a trial once more. Anyone farming from 50 to 100 acres in the Moreton district, could spare one or two acres as a trial. If the result prove unsatisfactory, the loss is not very great, but the lesson gained would be invaluable. On the other hand, if it were successful it would not be long before the lands now devoted to a few cows and horses in West Moreton would once again be white with the fleecy crop, and Brisbane, Ipswich, Laidley, and other centres of farming operations would resound with the pleasant hum of the gins.

Over-production is not to be feared. In 1898, Great Britain, the Continent of Europe, the United States, and India consumed 11,976,000 bales of 500 lb. The United States in that year produced 10,897,857 bales, of which only 7,700,528 bales were exported, leaving 4,275,472 bales to be supplied by the smaller cotton-growing countries, of which Queensland should have been one. The price of middling upland cotton in the principal markets of the United States was, in 1898-1899, 6.59 cents (3½d.) per lb. Prices are expected to increase during the ensuing season.

TRASHING SUGAR-CANE.

In Louisiana it appears not to be the custom to trash cane. Some experiments in that direction have been made, but they do not seem to have been sufficiently successful to induce the continuance of the plan, which is necessarily expensive. The attention of the *Louisiana Planter* has been called to the matter in an article by Mr. Binnie (here republished) in the January report of the West Indian Committee, and that journal recommends a consideration of it in Louisiana:—

Mr. Binnie says that it is an advantage to trash cane when it has grown to the length of from 2 to 3 feet. In Louisiana we would find this length of practically matured joints somewhat before the 1st of September. He argues that if the cane then be trashed that that much of it will become ripier, and the canes then should be trashed again a fortnight before cutting, by which we presume he means that at this last trashing or stripping all of the leaves excepting those attached to the green joints at the top would be stripped away. These are interesting suggestions, and if experimented upon in even a moderate way here in Louisiana might lead us to some good results.

On the other hand, every effort that we are now making in cane culture is in the direction of the diminution of the human labour involved in carrying on the industry, and unless trashing became manifestly a very valuable process to us, it would be one of the processes that we should desire first to drop.

We submit Mr. Binnie's report on cane trashing in extenso and as follows:—

“In my opinion it is of the greatest advantage to the farmer to trash his cane when it has grown to the length of from 2 to 3 feet, as by so doing you let air and light into the cane, both of which are conducive to growth, you allow the young suckers to come away and make cane, and prevent water in the wet season from lodging around the cane inside the leaves, causing it either to throw out rootlets from the joints or to shoot from the eyes. This trashing also leaves a protection on the ground for the cane when it falls over, and by keeping it off the damp ground prevents it from rooting where it touches the soil; it cheapens the top trashing required just before harvesting, and prevents loss by breaking, and finally assists and cheapens cutting, as if done properly and the trash cleared well away from the stools, the cutter gets a clean blow at the

roots of the cane, and thus does away with the evil of cutting high, and leaves him no excuse for not cutting below the ground. The great advantages of a top trashing or stripping, if done about a fortnight before harvesting, are that it enables the cane by exposure to the air to ripen up, it allows the cutter to top off the stick close to the green top, and enables the farmer to give satisfaction at the mill by not sending green unripened cane. This year I have tried an experiment in two trashings as against one. In one field I trashed early in April, at a cost of 7s. per acre. I left one acre untrashed. This week I have stripped the field at a cost of 6s. 6d. per acre, and put two boys on to the acre untrashed. It has taken them four days to do the work, which at 6s. per day, means 24s. per acre for one trashing as against 13s. 6d. for the two."

It will be observed that Mr. Binnie's argument in favour of trashing are identical with those employed by ourselves in the April number of this *Journal*.—Ed. *Q.A.J.*

FEDERATION—ITS EFFECT ON THE TOBACCO INDUSTRY.

By J. H. FORREST.

The above question, doubtless, not only concerns the immense amount of capital invested in the industry, the welfare of the workers in the near future, but the prominence Queensland should and must take as a producer and competitor of leaf suitable for the manufacture of pipe and cigar tobacco in the markets of the world.

Tobacco factories in Queensland are placed in a very comfortable position in regard to being possessed of suitable soil for the production of raw material within her own centres—*i.e.*, Texas, Inglewood, Warwick, and Killarney. Each of these districts, under proper and scientific supervision at the start, are capable of producing an article, when properly handled and cured, equal and in many respects superior to that of any other country, America not excepted in ordinary grades.

Time alone will prove by continued experiments if we will be compelled to accept the inevitable in the matter of higher grades for better class of pipe, cigar, or even cigarette tobaccos.

I am sanguine enough, from what I have personally inspected in Queensland for the past four years at different periods, and perfectly convinced that the experiments, if carried on as suggested further on, will lead to satisfactory results, and that Queensland will ere many years become recognised as a tobacco-producing country.

To emphasise the situation to those who are not directly in touch with the enormous amount of trade done by America and Europe, the following figures may prove interesting:—

America produces yearly	...	...	500,000,000 lb.
Europe produces yearly	...	...	500,000,000 lb.

The number of people directly employed in the industry in America alone exceeds 4,700,000 persons; statistics bearing on Europe not obtainable here.

Apart from this enormous output by America, she is also dependent on other countries for certain grades, principally cigar wrapper leaf, the average weight of which exceeds 30,000,000 lb. yearly.

America, without doubt, stands unrivalled as a producer, because no other nation is so climatically situated to compete or even share to a great extent in this enormous trade; *but* Queensland and the northern portions of New South Wales are so situated for growing leaf to an unlimited extent (districts already mentioned); and there is no reason for doubt that Queensland alone is the only part of Australasia that could arrive at perfection in the growth of cigar leaf, likewise, in carefully selected places.

Here is a trade open to us, and which will have to be fought for sooner or later. Then, why delay?

The Government deserve every recognition by manufacturers and growers of leaf in obtaining the valuable services of the present expert from America; but the controlling influence in regard to satisfactory working to a successful issue might, I think, still be improved upon.

The crop at all times requires the most careful attention and skill in bringing it to a merchantable point, whereas, at time of writing, it is safe to say not one farmer in Queensland has ever attempted to arrive at the required standard in the way of experiments, nor is he aware what is practically termed cured strips graded ready for the manufacturer to make up into tobacco ready for consumption by the smoking public.

I make a suggestion with the object of endeavouring to get the growers of leaf in Queensland in line with American and European growers to export and compete in the world's market:—

The Government to acquire by lease or experiment, in conjunction with existing capable reliable growers, under the present conditions or on a co-operative system, say, 25 acres in each of the districts mentioned (Texas, Inglewood, Warwick, and Killarney). Erect proper curing-sheds; each shed to be under the supervision of reliable growers, and the whole to be under written instructions and personal direction of the expert. The task, no doubt, would be an arduous one at the commencement, but, providing the seasons are as good as we have had for the past four years, the effect would be magical.

The result of the experiment—*i.e.*, the leaf resulting therefrom—would bring a much higher price than that roughly cured out in the open. The experiment would pay for itself, the securing of ground and suitable shed erection being the only primary outlay.

After the first two crops are shown to be satisfactory, other farmers will follow, and without doubt curing-sheds will go up in the place of those standing at present, which are far from being creditable. The responsibility of the Government will then cease, excepting, of course, the continuing the services of an expert.

TOBACCO-GROWING IN IRELAND.

Last year we published a short account in the *Journal* (Vol. VI., p. 434) on some experiments in tobacco-growing carried out by the Donaghpatrick Co-operative Agricultural Society, County Meath, Ireland. The experiments went to show that tobacco would grow luxuriantly in that county, and that the manufactured article was a fairly good sample of strong, coarse tobacco, nearly twice as strong as the strongest sold. The cost of production, including manufacture, was 4d. per lb., and the excise duty 2s. 8d. per lb. The tobacco was sold wholesale for 4s. per lb., yielding a net profit of £132 per acre. Further experiments were to be made by the society in different parts of Ireland.

On this subject the *Agricultural Gazette*, London, in its issue of 1st March, 1901, writes:—“In reply to Mr. J. Campbell on Monday, Mr. Gerald Balfour said:—‘Experiments in tobacco culture were carried out by the Department of Agriculture in fourteen counties last year, with results sufficiently satisfactory to justify further trials this year. So far, only the stages of drying and fermenting in regard to last year's crop have been reached, and until the manufacture is complete it would not be possible to give figures as to the cost of cultivation, &c. All available details of the experiments will be found in the November and February issues of the *Journal* of the Department.’ We fear that all the trouble taken by the Department in this connection will be labour lost. The *Journal* of the Department gives the results of growing the crop in different parts of Ireland, and the arrangements made for growing it again in the present season. There never was any doubt, however, as to the possibility of growing tobacco in Ireland. The question is as to whether tobacco good enough to pay growers can be produced in that country. Some years ago Messrs. Carter and Co., Mr. Faunce de Laune, and a few other agriculturists grew fair crops of tobacco; but the quality was not good enough to satisfy smokers, and difficulties with the Excise authorities were troublesome. It was concluded that tobacco good enough to pay for the great expense of growing and curing it could not be produced in this country.”

Science.

ANALYSIS OF WATER FROM LOCKYER CREEK, GATTON.

The importance of a pure water supply for irrigation and for farm and station uses generally, cannot be over-estimated. This has already been demonstrated by Dr. Maxwell, who has analysed several samples in the Mackay and Bundaberg districts, and has shown that some are unsuitable for irrigation owing to the presence in superabundance of certain salts which, in excess, are injurious to the soil and to plant life. Many waters contain salts, soluble magnesia, chlorides, and nitrates, which, by decomposing, set free the respective acids which have a destructive effect on iron and galvanised iron. The accompanying analysis and report by Mr. J. C. Brännich, chemist to the Department of Agriculture, is therefore of great value :—

ANALYSIS OF WATER FROM THE LOCKYER CREEK.

								Grammes per Litre.	Grains per Gallon.
Silica	...	...	...	...	...	SiO ₂	...	·0095	·065
Carbonic Acid	...	...	...	...	...	C O ₂	...	·1535	10·745
Sulphuric Acid	...	...	...	...	...	S O ₃	...	·0024	·168
Chlorine	...	...	...	...	...	Cl	...	·3150	22·050
Nitric Acid	...	...	...	...	...	N ₂ O ₅	...	·0128	·896
Iron and Alumina	...	...	...	...	...	Al ₂ O ₂ + Fe ₂ O ₃	...	·0009	·063
Lime	...	...	...	...	...	CaO	...	·0762	5·334
Magnesia	...	...	...	...	...	MgO	...	·1604	11·228
Soda	...	...	...	...	...	Na ₂ O	...	·1670	11·690
Potash	...	...	...	...	...	K ₂ O	...	·0020	·140
Total	...	...	...	...	...	...	...	·8997	62·972
Less Oxygen equiv. to Cl.	...	...	...	...	...	...	...	·0710	4·970
Total	...	...	...	...	...	...	...	·8287	58·009
Potassium Chloride	...	...	In 49 per cent. Alcohol. Soluble.	{	K Cl	...	...	·0032	·224
Sodium Chloride	...	...			Na Cl	...	...	·3146	22·022
Magnesium Chloride	...	...			Mg Cl	...	...	·1495	10·465
Calcium Chloride	...	...			Ca Cl	...	...	·0174	1·218
Magnesium Nitrate	...	...			Mg (No. 3) ₂	...	...	·0175	1·225
Silica	...	...	In 49 per cent. Alcohol. Insoluble.	{	SiO ₂	...	...	·0095	·665
Iron and Alumina	...	...			Fe ₂ O ₃ + Al ₂ O ₃	...	...	·0009	·063
Calcium Sulphate	...	...			CaSO ₄	...	...	·0041	·287
Calcium Carbonate	...	...			CaCO ₃	...	...	·1172	8·204
Magnesium Carbonate	...	...			MgCO ₃	...	...	·1942	13·594
Total	...	...	...	...	...	...	...	·8281	57·967
Total Residue at 110° C.	...	...	...	...	...	...	...	·8156	57·092
Free and half Combined Carbon. Acid	...	...	...	...	...	...	...	·1140	7·980
Nitric Acid	...	...	...	...	...	...	...	·0128	·896
Ammonia	...	...	...	...	...	...	...	·000044	·003
Albuminoid Ammonia	...	...	...	...	...	...	...	·000120	·008
Nitrous Acid	...	...	...	...	...	...	...	Nil.	Nil.
Total hardness	...	...	...	...	...	...	...	...	32·9
Permanent hardness after boiling	...	...	...	...	...	...	...	...	30·0
Permanent hardness boiled with Soda	...	...	...	...	...	...	...	...	15·4
Specific Gravity, Sp. Gr. $\frac{20}{20}$	...	...	...	...	...	...	...	...	1·00092

This sample of water was taken from the Lockyer Creek, near the pumping station of the Queensland Agricultural College, on the 5th March, after a long spell of dry weather, the creek being very low, but, however, still running.

The water was perfectly clear, containing only traces of organic matter, but is rather hard and of saline character. The chief characteristic is the large amount of magnesium chloride found, besides a large amount of salt and other chlorides. No alkali carbonates are present.

We have always found that the water has a very destructive action on iron, galvanised iron, &c., and this is entirely due to the presence of soluble magnesium salts, chlorides, and nitrates, which have the peculiar property of decomposing (disassociating) in solution at the temperature of boiling water, setting free the respective acids. For the same reason, in the analysis, the amount of total residue directly found is slightly lower than the amount of all the constituents added up together.

Although the water contains some free and half-combined carbonic acid, the hardness is of a very permanent character, being very little lowered by boiling. An addition of slaked lime or washing soda reduces the hardness very considerably, and the destructive action of the magnesium salts will also be minimised by the addition of a small quantity of soda.

The water may be used safely for domestic purposes and watering of stock, also for irrigation, especially for such crops, which benefit by a small addition of salt, as for instance: mangels, beets, cabbage, turnips, and also lucerne. An excessive use of the water for irrigation must, however, be avoided, as the chlorides have a bad effect on soil by coagulating the clay, and thus ruining the texture of the soil; chlorides have also a very powerful solvent action on many of the mineral plant foods found in the soil, and excessive application of such water may lead to losses of valuable constituents.

A WARNING TO PURCHASERS OF OIL CAKES.

In conversation with a Logan farmer the other day, the subject of oil cakes was brought up, and he stated that the cakes he purchased in Queensland were not at all equal to what he had used in the old country. There seemed, he said, to be a preponderance of husk or bran in it.

Perhaps the following report, in the *Scottish Farmer*, will throw more light on the subject:—

The report of the Chemical Committee of the Council of the Royal Agricultural Society of England at its last meeting contained a very important communication from Dr. Voelcker, which buyers of cakes may profitably ponder. The point illustrated in the statement is the “unreliability under certain circumstances of the analysis given with cakes.” It is quite possible to sell cakes with an analysis which applies in a general way but has no specific bearing on the matter in hand. As told by Dr. Voelcker the story and its lessons need little emphasis.

A member of the society sent in November, 1900, for analysis a sample of linseed cake, the price charged for which was £8 17s. 6d. per ton. Dr. Voelcker reported:—“This is not a satisfactory cake, containing too much weed seed (rape chiefly), starchy impurity, and sand (1·79 per cent.). I consider it decidedly dear.”

The vendors said there must be some mistake about Dr. Voelcker's analysis, and enclosed a copy of an analysis by an analytical chemist, which they said was “of our last, the cake is exceptionally good, and why yours should be different we are at a loss to see.” The report read, “This is a 95 per cent. pure linseed cake, rich in oil.” The percentage of oil stated was 13·16, whereas Dr. Voelcker's analysis gave only 10·19 per cent. Dr. Voelcker remarked that the copy of analysis put in bore no date, and that there was nothing to identify it as referring to the delivery from which the particular purchase in question was made. Ultimately a sample was taken by the vendors from the actual delivery, and the vendors wrote to the purchaser on 11th January, 1901:—

“*Re Linseed Cake Analyses.*”

“We have thoroughly gone into this matter, and had cakes drawn from your farm analysed by another analyst, and we regret very much to say that they have not come out as they should, 95 per cent. purity—and your complaint is quite justified. We do not make these cakes ourselves, but they are manufactured for us by two firms on big contracts, guaranteed up to a certain analysis—viz., 95 per cent. purity and 11·12 per cent. oil, which, as everyone

knows, is a high standard of purity. From time to time we have them analysed, to see that our customers and ourselves are getting value for money, and we are pleased to say that only on one occasion before have we had reason to complain. The reason given by the manufacturers is that the men have allowed the bins to run too low, and this particular lot has got all the admixture which settles on the bottom of the bins after a night's work, which, if correct, is nothing but carelessness. We shall be pleased to make this matter right with you by an allowance, and would suggest 15s. per ton, which, we think, is about the difference in the value of cake which you should have had and what you have had delivered to you. We also wish to tender our very best thanks to you for having had the cakes analysed, and so brought the matter to light, which we will see never occurs again."

In the end an allowance of 22s. 6d. per ton was given. Dr. Voelcker, in reply, wrote on 16th January, 1901:—"I am obliged to you for letting me know further about the cake. And it is satisfactory to me to know that the vendors, after asserting that the cake was exceptionally good, now allow that my strictures on it were fully justified. This case shows you how little one can trust to analyses put out by vendors, and purporting to be that of a particular delivery, unless one obtains from them a definite guarantee that the cake actually being purchased is up to the quality set out. I am afraid I cannot quite follow the explanation given as to the cause of occurrence of the impurities. I reported weed seeds—rape chiefly—in abundance. I can understand sand settling out to the bottom of a bin, but I have yet to learn that rape and other weed seeds do so separate themselves out from linseed and collect more at the bottom of a vessel."

This report shows the value of the work done by the chemical department of national societies. It is of great importance to farmers that such methods of trade should be exposed, and they will be well advised to call in the aid of the authorised analyst whenever necessary. No honourable merchant fears the analyst.

FORESTRY IN THE UNITED STATES.

An Appalachian forest reserve is the subject of a Bill in Congress. This Bill would direct the Secretary of Agriculture to purchase not more than 2,000,000 acres of forest land in these mountains in Virginia, North and South Carolina, Georgia, Alabama, and Tennessee, and to there establish a park. The purpose is stated to be the preservation of the richest hardwood forests of the United States and their scientific culture and utilisation. This country is also one of the most picturesque and attractive in the United States, and the conservation of our water powers is also an important element in the project. The Bill would appropriate 5,000,000 dollars for the purchase of the land and development of the park.—*Engineering News*.

[We (*Queensland Agricultural Journal*) since learn, from the same source, that the Bill has been favourably reported on by the Senate Committee on Forest Reservations.]

The *News* also says:—The timber exports of the United States, including lumber and manufactured wood, amounted to 50,598,416 dollars (£10,119,683) in the fiscal year ending 30th June, 1900. The United States Bureau of Statistics says that the imports of corresponding products amounted to 20,591,908 dollars (£4,118,381), leaving a very handsome balance of trade in our favour; about half of this import comes from Canada, and the bulk of the remainder from tropical regions. The wooded area of the United States covers 1,094,496 square miles, or 37 per cent. of our territory; and we cut approximately 2 per cent. of our timber resources annually, or 40 billions feet B.M. estimated as timber available. The Bureau does not believe, however, that we are in danger of a timber famine. It holds that, as soon as the level of timber land values rises to the level of lumber prices, indiscriminate cutting will largely cease, scientific forestry will prevail, and forest fires will be systematically prevented or controlled.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.												1901.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	
North.														
Bowen	0.40	0.88	0.59	0.89	1.14	0.96	0.76	0.12	0.31	0.05	2.30	17.25	6.23	
Cairns	1.98	8.90	3.77	3.56	1.66	0.20	Nil.	2.44	1.52	1.61	4.19	11.53	22.09	
Geraldton	2.36	8.86	8.86	8.33	2.34	1.02	Nil.	2.63	3.17	2.39	18.68	23.32	32.93	
Herberton	0.23	1.97	2.19	0.57	0.12	0.98	Nil.	0.74	Nil.	3.11	4.01	8.25	4.16	
Hughenden	1.04	0.01	Nil.	0.11	0.02	2.45	Nil.	0.14	Nil.	0.10	0.61	1.62	1.41	
Kamerunga	1.01	8.60	3.25	3.65	Nil.	0.18	0.03	1.42	1.98	1.28	2.38	15.91	22.36	
Longreach	0.48	Nil.	Nil.	0.14	Nil.	2.34	0.50	Nil.	Nil.	0.19	0.11	0.41	0.22	
Lucinda	1.71	4.90	4.44	9.08	1.10	1.04	0.08	0.44	1.33	0.88	2.48	31.80	24.76	
Mackay	0.65	4.12	2.40	2.89	2.00	3.25	0.74	1.19	0.48	0.12	7.00	24.85	8.99	
Rockhampton	0.25	1.64	0.93	1.38	0.71	1.70	0.92	2.52	0.53	1.15	0.68	0.49	8.26	
Townsville	0.07	1.68	0.87	2.31	0.41	0.57	0.12	0.25	0.91	0.05	0.76	14.91	12.94	
South.														
Barcaldine	0.65	0.09	2.03	1.38	0.29	4.38	1.63	0.03	Nil.	0.30	1.20	0.15	1.17	
Beenleigh	3.19	3.16	1.25	7.55	2.18	4.77	1.06	1.90	0.26	2.80	1.49	5.99	4.30	
Biggenden	0.40	2.81	0.28	3.06	1.43	3.23	0.98	3.07	0.87	1.65	0.06	1.11	2.55	
Blackall	1.31	0.63	0.63	2.19	0.33	2.21	0.66	0.12	Nil.	0.29	0.17	0.29	0.90	
Brisbane	5.18	3.37	1.38	5.45	2.68	4.36	0.79	1.52	0.14	2.48	0.55	3.43	2.96	
Bundaberg	0.86	1.86	1.15	3.97	1.46	5.20	1.14	1.56	3.05	1.06	1.28	2.34	2.61	
Caboolture	4.18	5.66	1.42	7.04	2.14	3.73	1.56	2.94	1.99	0.86	2.11	1.11	5.51	
Charleville	0.08	0.79	Nil.	1.15	1.31	1.80	0.13	0.59	0.13	0.19	1.13	0.19	0.22	
Dalby	6.31	2.80	2.46	2.54	1.29	1.70	1.72	1.67	Nil.	1.77	3.37	2.89	0.44	
Emerald	1.22	3.97	0.42	2.72	1.15	3.96	0.52	0.35	0.18	0.31	1.03	3.65	4.43	
Esk	2.34	4.73	1.50	4.78	1.89	2.85	1.39	3.00	Nil.	1.35	1.80	3.99	3.15	
Gatton College	4.07	3.13	2.24	4.24	1.15	2.73	1.33	2.81	Nil.	4.12	0.47	6.27	1.54	
Gayndah	2.07	1.11	1.22	2.57	0.88	3.36	1.42	3.28	3.21	1.84	0.08	1.22	2.10	
Gindie	0.57	1.04	0.96	3.01	0.92	3.01	0.55	0.22	0.27	0.49	1.32	1.57	1.62	
Gympie	1.84	2.76	1.05	3.63	0.82	3.34	0.84	5.67	0.18	0.84	0.47	2.57	3.10	
Ipswich	1.66	1.85	1.47	4.73	1.45	2.25	1.17	1.37	0.01	3.93	0.47	2.09	2.88	
Laidley	3.15	2.87	1.94	4.36	1.41	2.28	1.08	2.39	Nil.	4.55	0.63	4.01	1.58	
Maryborough	1.78	3.26	1.17	4.33	1.21	4.32	0.57	3.55	1.22	0.68	1.18	5.03	5.51	
Nambour	5.64	4.67	2.78	7.77	1.35	3.42	1.81	4.15	0.52	1.91	2.19	4.25	9.13	
Nerang	3.37	3.06	0.47	18.28	2.84	7.74	1.08	2.79	0.26	3.02	2.92	4.26	4.22	
Roma	1.52	4.40	0.23	2.07	2.14	2.14	1.05	0.77	0.66	2.20	3.28	1.13	0.11	
Stanthorpe	4.81	1.87	1.70	3.17	1.22	2.26	1.50	3.98	0.23	2.17	2.16	1.94	0.80	
Taroom	3.65	2.92	2.11	2.55	1.40	2.46	2.92	2.26	1.47	0.45	0.24	1.40	0.10	
Tambo	1.55	0.30	0.02	2.94	1.49	1.75	0.59	0.19	Nil.	1.87	1.52	0.52	0.51	
Tewantin	4.87	5.36	1.02	5.90	3.03	5.89	1.97	5.78	1.48	0.74	0.95	7.04	14.18	
Texas	3.39	1.63	1.43	3.35	1.86	2.72	0.66	2.68	0.35	2.67	3.33	1.29	1.35	
Toowoomba	2.90	2.87	2.00	4.67	1.69	2.47	1.35	1.95	0.43	2.42	2.40	3.60	1.76	
Warwick	4.19	1.93	1.01	3.31	1.23	1.99	1.11	2.72	0.13	2.01	2.50	2.90	0.26	
Westbrook	3.71	1.78	1.81	3.04	1.16	1.85	1.18	0.60	0.04	4.59	1.35	1.88	0.73	

CLEMENT L. WRAGGE,

Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian choicest, 100s. to 110s. to 114s. ; New Zealand, 100s. to 110s. ; Danish, 112s. to 116s. per cwt.

CHEESE.—American, 20s. to 63s. ; Canadian, 40s. to 54s. ; New Zealand, 50s. to 64s. per cwt.

SUGAR.—Refined, £16 to £16 10s. per ton ; German beet, 88 per cent., 9s. 3d. per cwt. f.o.b. ; Hamburg, 11s.

SYRUPS.—6s. to 14s. per cwt.

MOLASSES.—4s. 6d. to 7s. per cwt.

RICE.—Rangoon, 9s. to 16s. ; Japan, 14s. to 22s. ; Java, 19s. to 25s. ; Patna, 18s. to 24s. per cwt.

COFFEE.—In bond (duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.), Ceylon plantation, finest 80s. to 110s.; pea-berry, 50s. to 115s.; small to good middling 55s. to 60s.; Mocha, 70s. to 90s.; Jamaica, smalls, 34s., good to fine greenish, 40s. to 43s., bold, 61s. 6d. per cwt. Santos: Large purchases have been made by a New York speculator, and “futures” have had a sharp rise. Quotations were: February, 31s. 3d.; March, 31s. 6d.; May, 32s.; July, 32s. 3d.; September, 32s. 6d., and December 33s. per cwt., being about 1s. 9d. per cwt. above the lowest of the week. The Brazilian crop is now estimated at 12,500,000 bags.

ARROWROOT.—St. Vincent, $1\frac{3}{4}$ d. to $4\frac{1}{2}$ d.; Natal, $5\frac{1}{2}$ d. to $6\frac{1}{4}$ d.; Bermuda, 1s. 8d. to 1s. 10d. per lb.; English, 29s. 6d. per 504 lb.

WHEAT.—Australian, 32s.; New Zealand, 29s. to 30s. 6d. per 496 lb.; Duluth, 34s.; Manitoba, 34s. per 480 lb.

MALTING BARLEY.—English, 31s. to 34s. per 448 lb.; Californian, 26s. 6d. to 27s. 6d. per 448 lb.

OATS.—New Zealand, 26s. to 27s. per 384 lb.; Canadian, 16s. 6d. per 320 lb.

SPLIT PEAS.—42s. per 504 lb.

GINGER.—Cochin, medium small rough cut, 33s. to 47s.; Jamaica, small brown washed, 40s. 6d. per cwt.

PEPPER.—Capsicums, 20s. to 90s.; Chillies, 26s. to 43s. per cwt.

TOBACCO.—Prices remain much as quoted last month.

WINE.—Wootonga, red, 13s. per dozen bottles to 17s. per dozen quart flagons; waratah, 18s. to 23s. per dozen; fair red wine (Australian claret type), in bond, 2s. to 2s. 6d. per gallon.

GREEN FRUIT.—Apples (ex “Ormuz”) South Australia, New York pippins, 12s. 6d. to 15s.; Tasmanian spotted, 7s. to 10s. per case; pine apples, 3s. to 5s. each; Oranges, common, 9s. to 11s.; medium, 12s. to 14s.; fine, 14s. to 18s.; finest selected, 24s. to 41s. per 420; lemons, finest selected, 15s. to 17s.; ordinary to fine, 8s. 6d. to 14s. per 420; bananas, 12s. to 14s. per bunch.

COTTON.—Sea Island, seed, 2d.; ginned, 8d. per lb. Clean upland has advanced for “future” deliveries, at Liverpool, to about $5\frac{1}{2}$ d. per lb.

COTTON WASTE.—21s. to 30s. per cwt.

COTTON SEED.—£6 6s. 3d. per ton.

OIL CAKE.—Decorticated cotton.

COTTON-SEED OIL.—Crude, 18s. 6d.; refined, 20s. to 21s. per cwt.

EGGS.—French, 11s. to 11s. 6d.; Russian, 6s. 3d. to 7s. 9d.; Danish, 9s. 6d. to 12s. 9d. per 120.

HONEY.—Australian, 66 packages returned unsold; Jamacia, 24s. to 28s.; Californian, 42s. 6d. per cwt.

BEESWAX.—1s. 2d. to 1s. 5d. per lb.

OLIVE OIL.—£35 to £40; eating oil, £50; sublime. £60 to £85 per tun.

LINSEED.—49s. to 65s. per quarter.

LINSEED OIL.—£25 to £25 10s. per ton.

LINSEED OIL CAKE.—£8 to £8 5s. per ton.

WOOL.—The next series of London wool sales will open on 30th April. Closing prices given in the last issue of the *Journal*.

FROZEN MEAT.—The following are the latest quotations (London, April 13) for the various descriptions of frozen meat mentioned:—New Zealand Mutton (crossbred wethers and merino ewes): Canterbury, $4\frac{3}{16}$ d.; Dunedin and Southland, $3\frac{7}{8}$ d.; North Island, $3\frac{11}{16}$ d. Australian Mutton (crossbred and merino wethers): Heavy (over 50 lb.), $2\frac{3}{4}$ d.; light (under 50 lb.), $2\frac{7}{8}$ d. River Plate Mutton (crossbred and merino wethers): Heavy, $3\frac{3}{16}$ d.; light, $3\frac{3}{16}$ d. New Zealand Lambs: Prime Canterbury (32 lb. to 42 lb.), $5\frac{3}{8}$ d.; fair average, $5\frac{1}{8}$ d. Australian Lambs: Prime (32 lb. to 40 lb.), $4\frac{7}{8}$ d.; fair average, $4\frac{1}{2}$ d. New Zealand Frozen Beef (fair average quality): Ox fores (100 lb. to 200 lb.), $3\frac{3}{16}$ d.; ox hinds (180 lb. to 200 lb.), $3\frac{5}{8}$ d. Australian Frozen Beef (fair average quality): Ox fores (100 lb. to 200 lb.), $2\frac{7}{8}$ d.; ox hinds (160 lb. to 200 lb.), $3\frac{1}{4}$ d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs or heavies, or inferior qualities.

BACON.—Irish, 67s. to 68s.; American, 42s. to 45s.; Canadian, 56s. to 62s. per cwt.

HAMS.—Irish, 90s. to 100s.; American, 42s. to 50s. per cwt.

HIDES.—38 lb. to 46 lb., $5\frac{1}{4}$ d.; 48 lb. to 56 lb., $6\frac{1}{4}$ d.; 60 lb. to 68 lb., $7\frac{1}{2}$ d. per lb.

SKINS.—Calfskins, 2s. 6d. each. Sheepskins, 5d. to 6d. per lb.

TALLOW.—Beef, 27s.; mutton, 28s. 6d. per cwt.

DISCOVERY OF NITRATE OF SODA.

If Professor G. E. Bailey (Cal.) is not mistaken, there should shortly be a good time in store for farmers who use artificial fertilisers at all extensively. Professor Bailey states that in the Death Valley, California, immense deposits of nitrate of soda exist, and that the section is as rich in nitrates as the famous nitrate districts of Peru. These deposits, he says, have been formed by the subsidence of the ocean. In this instance the rising of the Sierra Nevada mountains left a large portion of the ocean without any outlet and with an insufficient inflow of water to balance the evaporation, the result being that vast deposits of chemicals carried in the sea-water have been made.

Should this statement be correct, it is probable that the vastly increased output will result in a corresponding decrease in the price of nitrate of soda. Farmers will be enabled to use it more extensively with the further result that larger crops will be raised on farms where hitherto very little of any fertiliser has been employed.

Animal Pathology.

ON THE VALUE OF TUBERCULIN.

No. 1.

By C. J. POUND,
Government Bacteriologist.

In this and the following articles I have made reference to the writings of several eminent authorities on tuberculin and bovine tuberculosis, including Sam. Woodhead, McFadyean, Barry, Koch, and Nocard, &c.

A somewhat general opinion prevails amongst stockowners that certain breeds of cattle are very susceptible and predisposed to tuberculosis, while there are others, such as the Devens and Herefords, which are spoken of as being more or less able to resist the disease.

Such, however, has not been borne out by any experimented evidence, although, by the light that has been thrown on the matter by means of the application of the tuberculin test on an extensive scale, it certainly does appear at first sight that certain milking strains, such as Shorthorns, Jerseys, and Ayrshires, have a greater tendency to the disease. Nevertheless, if we carefully analyse any case where tuberculosis is alarmingly disseminated throughout the herd, we are at once forced to the conclusion that the conditions under which the animals have lived, together with the surrounding circumstances, have very materially assisted in the spread of the disease from one animal to another.

A cow suffering from tubercular lesions of the lungs, when coughing, expels from its mouth and nose mucous containing active tubercle bacilli into the manger or feed-box, where it naturally dries and gets mixed with the food. In this state it might be inhaled and the germs grow in the lungs, or it might be swallowed and produce tuberculosis of the intestines and the mesenteric glands. There can be very little doubt that at St. Helena, after the disease had been introduced, it was spread amongst the cattle in the above manner.

It is frequently argued that in calves which are born of tubercular parents the disease remains latent, and only manifests itself by external symptoms after the animals have reached maturity. This argument is without foundation, for it has been repeatedly shown by the most crucial experiments that healthy calves born of healthy parents may be readily infected by feeding with, or by the inoculation of, any tubercular matter; moreover, the disease will invariably progress to such an extent as to cause the death of the animal. On the other hand, calves that are born of tubercular parents, if removed from an infected atmosphere, kept under good hygienic surroundings, and fed on sterilised milk or other food that is free from tubercle, will not show any taint of this disease even when they arrive at maturity.

Animals that are affected only slightly with tuberculosis, but kept under favourable conditions with healthy surroundings, will frequently live for years without the disease making any apparent headway in their systems, and were it not for the tuberculin test, the presence of this disease would hardly ever be recognised in animals of this class. This special point has been strikingly confirmed in the experiments on the St. Helena cattle, where, as will be seen in the accompanying photographs, the four tuberculous cows remained in a good condition suitable for breeding purposes for several years.

To destroy such animals in order to eradicate the malady often wipes out of existence not only large money values but, what is of far greater importance, it may needlessly destroy the labour of years spent in careful and selected breeding.

There are many well-known breeders who have been engaged for years, and in some instances devoted their whole life, in building up a strain that is noted for several points of excellence in some one direction. Suppose that in consequence of the discoverable existence of tuberculosis, the herd on which years of labour have been expended is killed, there is at once destroyed the actual capital involved in the animals in question; but the potential values that are lost are much greater, for money alone cannot replace these in any way.

So long as tuberculosis was considered as absolutely incurable and hereditary, and, so long as it was generally recognised that the only way of effectively stamping out the disease was by destroying all animals that reacted to the tuberculin test, this method of wholesale slaughter was more or less justifiable, because it is only right that we should be on the safe side in matters pertaining to the public health. Now, however, thanks to the very valuable researches in Denmark by Professor Bang, which have been confirmed in the most marked manner by competent observers in other countries, it has been definitely shown that a reaction to the tuberculin test does not necessarily mean that the dairy products from such an animal are dangerous to human health; also, that it is perfectly safe under certain conditions to keep such an animal in a herd for even years. Consequently, the need of compulsory slaughter of all animals that react to the tuberculin test becomes less evident.

Some six years ago, in the early days of tuberculin testing, when little or nothing was known of the above facts, Lord Spencer, of Althorpe Park, was persuaded by Professor McFadyean, of the Royal Veterinary College, London, to have the whole of his celebrated Jersey herd tested with tuberculin. All the animals exhibited a very marked reaction, and after due consideration were destroyed. On *post-mortem* examination the correctness of the test was readily proved, for in every animal could be found one or more typical lesions of the disease, thereby proving the great certainty of tuberculin as an aid in the diagnosis of tuberculous cattle. It was pointed out by Professor McFadyean that during life there were only two animals that presented even slightly suspicious symptoms of tuberculosis, while the remainder to all appearances were perfectly sound and healthy.

There cannot be the slightest doubt that had Lord Spencer or Professor McFadyean known as much then as they do now, it is quite obvious that at the present time there would be at Althorpe Park a splendid herd of Jersey cattle, with all the highest points of excellence, &c., that can be obtained in this particular breed, and, further, they could all have been guaranteed free from any trace of tuberculosis, notwithstanding the fact that they were directly descended from absolutely proved tubercular ancestors.

In the United States there are a number of well-known Agricultural Colleges possessing dairy herds upon which thousands of dollars have been expended in bringing them up to the highest standard of efficiency as regards their milking qualities and showyard values, but, when tested for the first time, everyone interested was completely astounded at the extraordinary percentage of tuberculous animals. What, indeed, appeared most conspicuous, was the fact that the disease was invariably present on those animals whose money values were greatest, and in consequence were specially cared for and well groomed and fed, and always rugged and housed during the slightest signs of cold weather. In some of these cases the Althorpe Park method was carried out, every animal that reacted being destroyed. In others, only those which clinically exhibited any signs of tuberculosis were destroyed, while all the other reacting animals were isolated from the healthy portion of the herd and used expressly for breeding purposes, in order that the many good qualities of the original herd might be transmitted and permanently maintained. Where the necessary special assistance was obtained, and money ungrudgingly devoted, some marvellous results were achieved, which have proved highly instructive as to the value of intelligent management.

Perhaps one of the most interesting cases is that of the Agricultural Experimental Station at the University of Wisconsin, U.S.A. In January, 1896, the dairy herd there was tested for the first time, when sixteen animals reacted and eighteen were found healthy. The two lots were then separated, and the divisions handled as two separate herds, but as soon as a calf was born of a tuberculous mother it was removed to the healthy division and fed on boiled milk. When each animal in the affected section began to show unmistakable signs of decline it was destroyed, as natural death was not allowed to occur. It became necessary, before the rebuilding of the herd was begun, to thoroughly disinfect with corrosive sublimate solution, and limewash the whole of the buildings occupied by the herd, and also to repeat the operation at various intervals.

The following table shows a record of repeated tuberculin tests made on the Wisconsin herd, in which the progeny of reacting animals was separated from the dams at birth, also the actual condition of the herd after each test:—

Date of Test.					Number of Animals Adjudged by the Test.		Tuberculous Section.		Healthy Section.
					Healthy.	Diseased.	Healthy.	Diseased.	
January, 1896	...	...	...	...	18	16	...	16	18
May, 1896	...	...	...	...	21	14	4	14	17
April, 1897	...	...	...	...	30	13	11	13	19
December, 1897	...	...	...	...	36	11	13	10	23
February, 1899	...	...	...	...	64	7	27	7	37

The above table clearly demonstrates the complete check given to the spread of the disease. Notwithstanding that the disease progressed in the affected animals, the number of diseased animals lessened, while the young from both the healthy and the diseased divisions always stood the test, showing that the disease is contracted after birth, and not, as is generally believed, inherited from the affected dam or sire.

Agricultural Patents.

PATENTS ACCEPTED.

SPLITTING, CLEANING, AND SCUTCHING FIBRES.—Class 39 (14 Figures): Samuel Benjamin Allison, of S 1/2 and 35th streets, Galveston, Texas, United States of America, mechanical engineer. “Improvements in Machines for Separating the Fibres of Plants.” Dated 7th June, 1900. (Drawings, 30s.; specification, 9s. 6d.) The stalks are fed by a grooved travelling belt between rolling knives alternating with guide ribs or flanges; beyond are other breaking rollers with guiding concaves, leading to reciprocating scutching bars; beyond again are scraping knives and teeth, and splitting rollers arranged on the surface of belts or drums. Several alternative detail arrangements are described.

RECIPROCATING HAND CANE CUTTER.—Class 30 (2 Figures): Ralph Herbert Paul, of Supreme Court, Townsville, Queensland, judge’s associate. “A new or improved Sugar-cane Cutter.” Dated 30th June, 1900. (Drawings, 7s. 6d.; specification, 4s.) A reciprocating pneumatic or other tool-motor of any suitable type is attached to a fine saw-blade or circular knife. The tool is held in the hand and supplied with compressed air from a portable compressing plant. When a circular knife is used it is provided with stop-holes and a locking-peg so that the operating part of the edge can be changed as it becomes dulled.

MEASURING MILK AND OTHER LIQUIDS.—Classes 32, 57 (2 Figures): James Marchbank, of Pinnager street, Broadford, Victoria, mechanical engineer, and Niels Percy Bidstrup, of Broadford, Victoria, mechanical engineer's improver. "Improved Apparatus for Automatically Drawing off, and Measuring to Scale in Predetermined Quantities, Skim-milk and other Fluids." Dated 6th August, 1900. (Drawings, 10s. ; specification, 7s. 6d.) The store tank communicates with a smaller measuring tank by a supply pipe with valves or cocks. In the measuring tank is a float balanced by a weight upon which a projecting pin can be adjusted to a vertical scale representing any quantity desired to be measured. When the desired quantity has run in, this pin strikes a trigger gear which releases a weighted lever that on falling closes the inlet pipe and opens a discharge cock or valve.

FEEDING MILK TO CREAM SEPARATORS.—Class 32 (6 Figures): Aktiebolaget Separator, of Stockholm, Sweden (Assignees of John Joseph Berrigan, of Orange, county of Essex, State of New Jersey, United States of America. "Improvements in Feed Devices for Centrifugal Liquid Separators. Dated 1st October, 1900. (Drawings, 17s. 6d ; specification, 6s.) To remove the resistance to the passage of the incoming milk through the layer of cream in the centre of the whirling vessel, and consequent loss of effect by eddies, the admission apertures are situated at such a radius that the density of the entering milk is as nearly as possible the same as the temporary density of the stratum of milk under the whirling action. In separators with conical guide-plates, the feed apertures are made upon radial extensions of the central pipe, or on pipes parallel to it at the desired radius.

SUGAR-JUICE TREATMENT AND CONCENTRATION.—Classes 23, 30: Samuel Morris Lillie, of 328 Chestnut street, city and county of Philadelphia, Pennsylvania, United States of America, chemist. "Improvement in Method of and Apparatus for Treating Solutions." Dated 5th November, 1900. (Drawings, 17s. 6d. ; specification, 12s.) The juice is treated with chemicals under high temperature and pressure; then, on releasing pressure, evaporation and concentration ensues, the steam given off being used for previous heating. The cool juice is sprayed down a low-pressure heater in which waste steam is utilised by admixture; it collects at the bottom, and is pumped to a second high-pressure steam-heater to attain the highest temperature, after which it collects in a storage tank under pressure. From the storage tank the juice passes to a pressure-reducing tank, and is afterwards filtered and evaporated, the expanded steam returning to the first spray-beater. Automatic and adjustable float-controlled valves regulate the passage of the juice from one stage to the next. The apparatus may be used for other solutions than sugar.

HARVESTERS, WINNOWER AND BAGGING.—Class 29: Hugh Victor McKay, of Yuille street, Ballarat, Victoria, machinery merchant. "Improvements in Stripper Harvesters." Dated 19th November, 1900. (Drawings, £3 ; specification, 21s. 6d.) This invention relates to harvesters of the type that strip, winnow, and bag grain in the field. The improvements comprise:—1st, the combination of a peg drum for threshing the cloaked heads, with an endless elevator leading from the beater drum; 2nd, side-by-side arrangement of elevators for the grain, unthreshed heads, &c.; 3rd, means for supporting and adjusting the winnowing frame; 4th, a wind adjuster for the fan; 5th, contrivances in and for imparting a shaking motion to the riddles; 6th, an apparatus for screening the grain; 7th, grain-separating and bagging apparatus; 8th, novel gear for locking and unlocking the worm of the segmental lifting gear; 9th, of a combined bag-shaker and brake gear; 10th, a combined draught pole and a tilting or adjusting apparatus for the comb end of the machine; and to the several combinations of parts as described.

ADJUSTABLE BUCKET SUPPORT.—Class 32—(2 Figures) 5819: William James Muir, of Poowong East, Victoria, farmer. “Improvements in Bucket Supports and the like.” Dated 21st December, 1900. (Drawings, 7s. 6d.; specification, 5s. 6d.) This device is mainly for supporting a dairy milking bucket on the knees of the milker. A metal hoop surrounds the bucket, and can be adjusted in girth by several catches in the fastening. At each side a bracket overhangs the knees and supports the hoop and bucket. A further hook, coupled to the adjustable fastening by toggle links, and, catching on the bucket rim, prevents the hoop slipping down off the bucket.

STEAMING FUMIGATOR.—Class 81—(1 Figure) 5815: Jean Bardin, chemist, of Brussels, Belgium. “Improvements in Apparatus for Disinfecting, Deodorising, Fumigating, and similar purposes.” Dated 18th December, 1900. (Drawings, 5s.; specification, 8s. 6d.) The lower part of the case contains a perforated plate on which tinder fuel may be slowly burned; above this is an annular open top water-boiler, above which is another annular tray, a vessel containing the formol or other substance to be vaporised. The flue passages are arranged so that the formol tray can only be heated by the passage of hot moist vapour from the boiler. (3 claims.)

COMB-SHEARS, PIVOT MOTION.—Class 36—(4 Figures) 5784: William Henry Eyres, of Hamilton street, Sydney, New South Wales, commercial manager. “Improvements in Machines for Shearing and Clipping Wool or Hair.” Dated 26th November, 1900. (Drawings, 10s.; specifications, 6s. 6d.) In a crank-driven machine of the “Wolseley” type, the rocking arm swings on a central pivot pressed down by a locked screw, the outer end carries the loose cutter by a pair of renewable studs or screws, and the back end carries a roller-bowl, which reciprocates laterally on a flat track above the crank bearing. A flexible dust shield closes the frame-space outside the central pivot.

COMPRESSED AIR VENTILATION.—Classes 32, 82, 88, 96—5750: John Clarke, of Orangeville, Dufferin, Ontario, Canada, grain merchant. “Preservation and Purification by Compressed Air.” Dated 3rd November, 1900. (Drawings, 12s. 6d.; specification, 10s. 6d.) Any chamber for storage or habitation is ventilated or purified by a supply of compressed air with a choked outlet; the air may be medicated or ozonized. A railway car is illustrated in which revolvable cowls convey fresh air to the interior which escapes by similar cowls with less area of passages, causing an increase of pressure in the interior with continual change of the atmosphere.

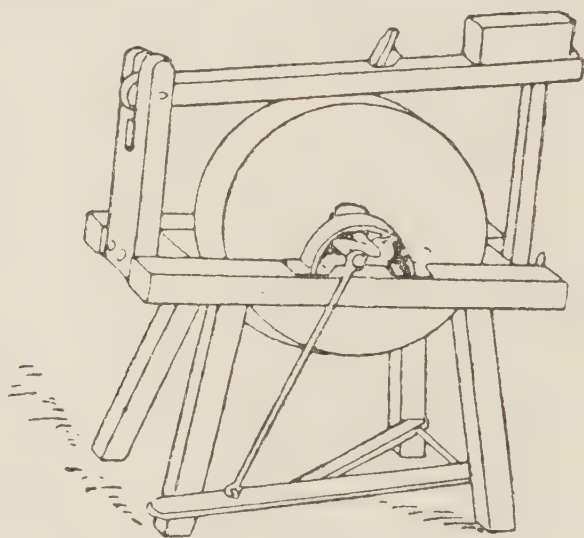
General Notes.

THE WATTLE IN NEW ZEALAND.

The Wairangi wattle plantation in the South Island of New Zealand contains 1,900 acres. The output of bark annually reaches 150 tons, and this will shortly be increased to 200 tons. The variety grown is the *Acacia decurrens*.

TRUING A GRINDSTONE.

A grindstone is very seldom kept in good working order; generally it is "out of true," as it is called, or worn out of a perfectly circular shape. A new stone is frequently hung so that it does not run "true," and the longer it is used the worse it becomes. When this is the case, it may be brought into a circular shape by turning it down with a worn-out mill-file. It is very difficult to do this perfectly by hand, but it is easily done by the use of the contrivance shown in the figure. A post, slotted in the upper part, is bolted to the frame. A piece of hardwood, long enough to reach over the frame, is pivoted in the slot. This should be made 2 inches wider than the stone, and be pivoted, so



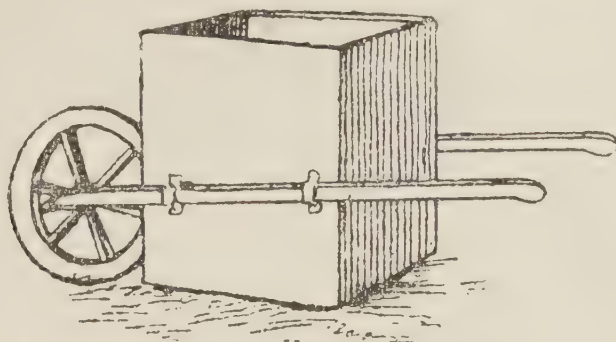
that an opening can be made in the middle of it, of the same width as the stone. This opening is made with sloping ends, so that a broad mill-file may be wedged into it in the same manner as a plane-iron is set in a plane. At the opposite end of the frame a second post is bolted to it. A long slot, or a series of holes, is made in the lower part of this post, so that it may be raised or lowered at pleasure by sliding it up or down upon the bolt. If a slot is made, a washer is used with the bolt; this will make it easy to set the post at any desired height. It should be placed so that the upper piece of wood may rest upon it, exactly in the same position in which the file will be brought into contact with the stone. A weight is laid upon the upper piece to keep it down, and hold the cutter upon the stone. When the stone is turned around slowly, the uneven parts are cut away, while those which do not project beyond the proper line of the circumference are not touched.—*American Agriculturist*.

TO TAKE INK OUT OF PAPER.

To take ink out of paper, wet a teaspoonful of chloride of lime with a little water; apply to the spot with a cloth, but do not rub it. The ink will gradually grow fainter till it entirely disappears.

A HANDY TANK.

There are many useful contrivances which farmers can construct for themselves out of materials at hand, and by which a considerable amount of labour can be saved. Amongst these is one described in the *American Agriculturist*, from which journal the accompanying cut is taken. It consists



of a square tank of galvanised iron with sockets on each side, through which a couple of handles are passed. To these is attached a barrow wheel. The tank can be used for many purposes which will naturally suggest themselves to an ingenious mind.

CROWING COMPETITIONS.

The Belgian artisan sometimes spends his leisure curiously. For instance, he keeps a special cock for crowing, and the bird which can outcrow its fellows has reached the highest pinnacle of perfection. The mode of operation is to place the cages containing the roosters in long rows, and then one bird will usually set the others crowing. A marker, appointed by the organisers of the show, is told off for each bird, his duty being to note carefully the number of crows for which it is responsible, in the same fashion as the laps are recorded in a bicycle race. The customary duration of the match is one hour, the winner being the bird which scores the highest number of crows in the allotted time.

HOLIDAYS.

There will be two holidays on the occasion of the visit of the Duke of York: Monday, the day of landing; and Wednesday, the opening day of the show of the National Association at Bowen Park.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Answers to Correspondents.

TO BOTTLE FRUIT JUICE.

INQUIRER.—Fruit juice, under the name of unfermented wine, may be preserved as follows :—Take almost any kind of soft fruit, press out the juice, separating it completely from skins and seeds. Then submit it to a heat of 180 degrees Fahr. (never higher than 190 degrees nor less than 175 degrees). Next, filter it through a conical flannel bag to extract the coagulated albumen and other flocculent matter. Finally, place in bottles. Put these into a boiler of cold water up to their necks. Bring the water to a temperature of 200 degrees Fahr.—do not let the water boil on any account; keep at that temperature for fifteen minutes; then cork and seal *at once* before cooling.

TO PROTECT VEGETABLES FROM INSECTS.

J.B., Bowen.—Your inquiry arrived too late for a reply in the last issue of the *Journal*, we therefore answered you by letter. As we have, however, other inquiries of the same nature, we repeat the advice given you. Get the ground intended for vegetables ready long before you sow or plant it. Turn it over frequently and give it the full benefit of light and air. A day or two before planting, give it a thorough turning over. This work will very effectually destroy grubs and their larvæ. Next, get an old tub or barrel, and tobacco waste from the factory. Make a strong solution of this. Failing waste, expend a plug or two of tobacco. It should not be too strong for use on young plants. Should grubs or fly appear, water the vegetables every other day with it. This will have more effect than Bordeaux mixture, Paris green, &c., which are fungicides, and are dangerous, as arsenic and sulphate of copper enter into their composition.

WORMS IN DOGS.

J.B., Isis.—Try the following recipe :—

Dried sulphate of iron, 1 part by weight.

Santonine, 3 parts by weight.

Freshly ground areca nut, 20 parts by weight.

Glycerine enough to make into balls.

The size or weight of the pill may be calculated at the rate of 3 gr. weight for every pound weight of the patient. Fast for at least twenty-four hours (thirty is better) and give in the morning; follow with exercise, and watch results. Sometimes a length of tapeworm wants helping out, as the contractions of the gut fail to expel a long, thin body, of which a portion is outside. If allowed to break off, some few sections will remain, and reproduce, as every segment is capable of reproduction.

THE ANGORA GOAT.

GOATHERD.—We have already described the Angora goat, and to avoid repetition we illustrate the animal in this issue. For the history and value of the Angora see this *Journal*, Vol. V., p. 526, and Vol. VII., pp. 416, 417, 419.

C.A.S., Kilkivan.—There is no law for the protection of the Angora goat. If, however, the raising of special breeds were to become a settled industry in the State, doubtless some protection would be given to the breeders of the valuable Angora.

R. SIMS, Lyndhurst.—There are, so far as known, no absolutely pure Angoras in Queensland. Mr. Wills, of Springsure, can supply high-grade Angoras, the fleeces of which realise good prices. The Angora is found in greatest purity in Natal.



1. A FINE SPECIMEN OF AN ANGORA RAM.
2. HEAVY-FLEECE ANGORA GOATS.

COW WITH WARTS BETWEEN THE HOOFS.

A correspondent asks the same question which was put to the editor of *Farm and Home*. We give the reply of that journal below, which coincides with the remedy suggested by our own vet.

SIR,—I have a valuable Ayrshire cow that has a kind of growth between the hoofs of one of her legs. It is painful to the cow, and causes severe lameness. What can you suggest as a remedy?—Yours, &c., DAIRYMAN.

Wauru Ponds.

[The following, we think, will be effectual in removing them:—Wash the parts with water, and then dust on freely some finely-powdered sulphate of copper (blue vitriol); tie a piece of rag between the hoofs to keep out the dirt, &c., and keep the animal in a dry place for a few hours after. Repeat the dressing twice a week so long as necessary. Should this treatment not be sufficiently powerful or rapid in removing the growths, touch them occasionally around their bases—that is, where they join the flesh or skin—with a stick of lunar caustic (nitrate of silver).]

SILVER FISH.

UNIFORM.—A camphor wood chest is a delusion and *not* a snare, so far as silver fish are concerned. Try blue gum and ti-tree leaves. The smell of the blue gum is almost certain to banish these insects.

WEEDS.

HORTICULTURIST.—You ask: “What is the least objectionable weed in a potato field?” The least objectionable weed is a dead one.

CURE FOR MANGE IN HORSES.

T. SLATIN, Nerang.—Stabling and well grooming are the best cure for Queensland mange. Where stabling and grooming are not possible, oleaginous substances are the most effective applications. We found sulphur absolutely useless. Many have been cured by daily washings with soft soap.

THE FIRST SILO.

J. SLEE, South Brisbane.—The first man to start a silo in the Australasian States was a South Australian farmer, a Mr. Charles Rake, of Enfield. The *South Australian Journal of Agriculture* says that prominent dairymen in the neighbouring States—colonies then—visited South Australia to see how silage was made, and they went back and adopted ensilage of fodder with highly profitable results.

ORANGE WINE.

T. D. SMITH, Barron Falls, Nambour.—Gather the fruit when ripe. Peel the oranges. Put into a vessel with the head out and a tap fitted near the bottom. Pour on boiling water to cover it. Mash the pulp with your hands, and then let the mass stand till the pulp rises to the top and forms a crust in three or four days. Then draw off the fluid into another vessel, and to every gallon add 1 lb. sugar. Mix well and put into a cask to work for a week or ten days, and throw off any remaining lees keeping the cask well filled, especially at the commencement. When the working has ceased, bung it down. It may be bottled after six to twelve months, or—

Express all the juice of the oranges in a press; strain. To every gallon of juice add 1 lb. sugar and half-a-pint brandy. Pour into a cask, but do not bung till it has done working. Then bung it close for three months, and draw off into another cask. When it is fine, bottle and cork well.

Orchard Notes for May.

By ALBERT H. BENSON.

The hints given in the notes for March and April on the gathering, handling, and marketing of citrus fruits apply equally to the present month, with this difference, however, that even more care is required, as the riper citrus fruits become, the more readily are they bruised and injured. May being usually a more or less dry month on the coast, the opportunity should be taken of cleaning up all weeds and rubbish that may have accumulated during the summer and autumn, and getting the surface of the land into a good state of cultivation, so that the comparatively small rainfall of the winter months may be conserved in the soil for the trees' growth. Unless this is done, fruit trees, especially citrus, are apt to suffer, especially if growing on shallow or badly drained soil with a retentive subsoil. Where not already done, all dead or worthless trees should be dug out; and if fresh trees are to be planted in the same place, then the holes from which the trees have been taken should be allowed to remain open, and the soil should be well exposed to the action of the atmosphere and be well sweetened. Land intended for planting during the winter should be got ready, more especially if it is new land, as it is a mistake to delay the preparation of the land too much, or to plant the trees in a raw, unsweetened, and improperly prepared land. What planting has to be done, see that it is done well, as an acre of land properly prepared will pay better than twice or three times that quantity treated anyhow.

Towards the end of the month, slowly soluble manures, such as boiling-down refuse or coarse bones, may be applied to the land, as they will become slowly available; and when the spring growth starts, the trees will get the benefit. Quickly soluble manure should not be applied now, but should only be used during a period of active plant growth, otherwise they are apt to be lost. Where possible, don't destroy the weeds and refuse of an orchard unless the same is diseased, or is likely to form a harbour for injurious insects, but rather form it into a compost heap, preferably with lime, and allow it to become well rotten, when it will be found to be a valuable manure for citrus and other trees in many soils; as, though our soils, as a rule, are great producers of weeds, many are actually deficient in vegetable matter, so that it is a mistake to burn off all weeds, grass, or other rubbish. This deficiency of organic matter in the soil is a serious consideration, as soils deficient in organic matter are usually deficient in nitrogen, and also they are deficient in the power to retain moisture—a matter of extreme importance in a country like this, where we are subject to such long spells of dry weather.

In the colder districts the pruning of deciduous trees may be commenced towards the end of the month, but in other parts of the colony it is better to wait longer, as the leaves are not off and the sap is not down. Pineapples, where at all subject to frost, should receive a light covering of grass or other similar material as a protection, or, where practicable, as in the case of scrub lands subject to slight frosts, they should be covered with a light framework covered with palm leaves or similar material.

Palm stems or saplings resting on forked posts, placed on either side of the bed to be protected, make a good framework; and with palm-leaves, tea-tree bush, or other similar material laid across from sapling to sapling, a very cheap and efficient protection against frost is obtained.

Gather and destroy all infested guavas, oranges, custard apples, &c., so as to destroy the larvæ of any fruit flies or peach moths that may be in them, as if these insects are well killed down now there will be many less to deal with next spring, and there is a chance of the earlier fruits being harvested without much loss.

Farm and Garden Notes for June.

FARM.—Although winter only commences on the 24th of June, still, early frosts will probably occur in the more exposed districts of South-western Queensland. Insects will now no longer be as troublesome as during the other seasons of the year, whilst the weeds cease to be a source of trouble and expense to the farmer. Now, therefore, is a most favourable time for sowing lucerne, rye grass, prairie and other grasses. When lucerne has been sown during April and May, a mild, dropping season will start a prolific crop of weeds which choke the young plants, and the farmer runs the risk of losing the whole crop unless he sets all his available resources to work to get rid of them.

Oats, barley, rye, vetches, clover, tobacco, carrots, mangolds, chicory, Swedes, and buckwheat may be sown. Now is the time to get the land ready for maize, millets, panicum, &c. It is recommended by some to sow maize during June in warm, sheltered situations, but we maintain that maize should on no account be sown during this month. All that should be done is to get the land ready for sowing towards the end of July and in August. The same remarks are applicable to potatoes. Early potatoes should not be sown until next month, and then only in very sheltered situations. The first frosts will now blacken the arrowroot tops and the bulbs fill out rapidly and may soon be taken up.

Dig all sweet potatoes, yams, ginger, &c. Sweet potatoes may be stored in sand, but they must be allowed to get perfectly ripe first. The stored tubers must not touch each other, and the air must be excluded as much as possible. The tuber is ripe when the juice of a broken one remains white on exposure to the air; if the juice blackens it is unripe, and not ready for storing. Before putting away spread the tubers out in the field or barn for several days exposed to the action of the air, as is done with apples before packing. Then lay down a thick layer of sand, on which place the first tubers. Then pour sand over them till they are covered and every crevice is filled. In this manner put down successive layers of sand and tubers. They are then safe, and will keep through the winter.

Wheat may be sown. It is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Cuttings of cinnamon and kolanut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and cut tobacco. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather til-seed (sesame), and in suitable weather plant out young tobacco plants. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples.

KITCHEN GARDEN.—Hoe well amongst all growing crops. Transplant horse-radish, eschalots, rhubarb, sea-kale. In planting rhubarb it is better to buy the crowns than to grow from seed. Plant out cabbages, cauliflowers, lettuce, &c. In general, sowings of all the usual vegetable seeds may be made. Thin out all earlier-sown root crops. As the weather during this and the two succeeding months is generally dry, the more thorough the cultivation the better. Towards the end of the month tomatoes intended to be planted out when the weather gets warmer, should be sown in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—As many kinds of plants need to be planted out early so as to root and gain strength during the cool moist spring time, no time is to be lost now. Raise only the best varieties. They cost no more to grow than poor ones. Prune all the hybrid perpetual roses, and tie up, without pruning, the climbing and tea-scented varieties. These and other shrubs may still be planted, and give abundance of spring bloom. Divide the roots of chrysanthemums, perennial phlox, and other hardy clumps. Cuttings of all the summer bedding plants may be propagated.

Sow in boxes in small quantities, carnation, dianthus, candytuft, larkspur, nasturtium, foxglove, Canterbury bells, pansy, petunia, picotees, hollyhock, stocks, wallflowers, zinnias. Mignonette is best sown in the garden where it is intended to remain. Bulbs may be planted as recommended for March.



HON. DAVID H. DALRYMPLE, M.L.A.

Photo by Poul C. Pulsen.

Born at Newbury, England, December, 1840, and educated at the Independent College, Taunton. He also attended lectures at the Bristol Medical School. Mr. Dalrymple came to Melbourne in 1862; to Rockhampton, Queensland, in 1863; and to Mackay, engaging in business as a Chemist and Druggist. He has always taken a prominent part in public affairs and has filled most of the offices in connection with local institutions in Mackay, and been elected on several occasions as Mayor. He is now engaged in pastoral pursuits as a member of the firm of Dalrymple & Murray Hamilton, and was returned at the 1888 election by a considerable majority as junior member for Mackay, and colleague of Mr. Hume Black. At the general election of 1893 he was re-elected and again in 1896. In 1895, Mr. Dalrymple accepted office as Secretary for Public Instruction in the Nelson Ministry, and held that office and, later, the office of Secretary for Public Lands, in the Dickson Ministry. Shortly after the lamented death of his colleague, the Hon. J. V. Chataway, Minister for Agriculture, he accepted the latter portfolio, retaining the position of Acting Minister for Mines during the absence in South Africa of the Hon. Robert Philp.

Agriculture.

ANY ONE CAN FARM.

This is an idea held by many people who would never dream of applying the same theory to the business of a merchant, lawyer, doctor, or sailor. They hold tenaciously to the belief that if the unemployed would only "go on the land," they would immediately begin to live in ease and comfort. They have a vague idea that "going on the land" is quite sufficient to provide anybody with a herd of milkers, horses, pigs, poultry, &c., and they prove to their own satisfaction that it is mere downright laziness that is the only stumbling block in the way of converting every town loafer, every out-of-work pastrycook, or draper's assistant, into a well-to-do farmer. Such theorists should learn that the business of farming is a real, live, broad profession, which demands both practical and scientific knowledge. Some hold that the practical part of a farmer's work is all that is necessary for a man to learn, but such reasoners are very far behind the times. The practical must undoubtedly be learnt, but it must be in conjunction with the theoretical. Science has done so much towards the work of renewing the producing powers of the soil, towards increasing the yields of nearly all crops, and the size and weight of very many of them, that the farmer who ignores the teachings of science is bound to be left behind. The man who has gone through the whole curriculum of an up-to-date agricultural college, is not the man, when he gets a farm of his own, to rest contented with what he has learnt there. He has found that amongst other things, he has learnt how to get more knowledge of his business and how to improve upon any particular method of farming. He does this by making experiments for himself, and in no direction can he experiment more usefully than by making trials of various kinds of manure, by making careful experiments in the feeding of stock, and by improving or keeping up to a high standard at all events, his cattle, horses, sheep, pigs, and poultry.

See what has been done in the matter of butter-making alone. In the old days butter-making was a slow laborious process. Good butter was certainly made, but the demand for the article is to-day so enormous that the setting of pans for the cream to rise, the skimming, the churning, the working by hand are all far and away too slow processes for a profitable result. Science invented the cream separator, rapid churns, mechanical butter workers, milk and cream testers, and all these require a considerable amount of study in order to attain perfection.

Then consider the vast array of agricultural implements which have come into daily use all over the civilised world. Where is the farmer of even 20 acres who would return to the old style of scythe and sickle, binding by hand, the flail, &c.? It was a very pretty sight to see a dozen men in a hay-field keeping rythmical time as the sharp scythes swished through the grass; it was music to listen to the regular tattoo of the flails in the barn, and the delight of hay-making fifty years ago in the old country is well known to all old-country dwellers from England, Scotland, or Ireland. It was picturesque, but nowadays the work must be of a utilitarian character. The old wooden hay-rake gives place to huge horse-rakes; the binders in their sun-bonnets, the reapers with their sickles are replaced by the modern reaper and binder; the steam-threshing machine has ousted the flail, and where one man laboriously plodded after his iron single-furrow swing plough, the farmer or his man now sits comfortably on a machine which turns four furrows at a time with no further labour to himself than occasionally guiding the horses or turning them at the headland. The intelligent farmer will have learnt how to keep these often complicated machines in good working order. Hence he must know something of carpentering, blacksmithing, and engineering. He need not be a professional at any of these trades, but a knowledge of them is essential, and he gains at an

agricultural college such a fair acquaintance with the rudiments of the trades that he can with little trouble afterwards add materially to the foundation laid.

At the University of Cambridge, England, a Department of Agriculture has been created, and a Chair of Agriculture constituted, so important is an agricultural education considered to be to the nation at large.

The inaugural address was delivered in November last by Professor Somerville under the title of "The Bearings of Education and Science on Practical Agriculture," and amongst other things he said: "The education of the young farmer is a subject regarding which one encounters considerable diversity of opinion. There are farmers in plenty who maintain that all formal instruction in agriculture is necessarily bad, though, when the position of such men is examined, it is generally found that they are really contending for a principle that is not seriously called in question. There is a disposition in some quarters to range theory against practice, and when this is done it is not very difficult to make out a very bad case for theory. But no sensible individual would ever think of proposing to substitute a theoretical or scientific training in agriculture for the kind of training that is to be had on a farm. A man can engage in the business of practical agriculture successfully only by mastering the practical details of the business. It is true that he may do so either as a learner on the farm of his father, or someone else who undertakes the financial responsibility; or, with insufficient knowledge, he may acquire a farm for himself, and gain his experience by the expensive process of a series of blunders. It is the example of men who have essayed to buy and to sell, and to manage labour, stock, and tillages, on class-room experience alone that has served, for the most part, to discredit the value of scientific instruction. It is curious that such cases should have misled anyone, and probably they have misled fewer than would at first sight appear. The choice does not really lie between practice and science, but between practice alone on the one hand, and practice supplemented by science on the other.

The farmers who are most successful at the present time are those who have made the fullest, though at the same time the most discriminating, use of the teachings of science. They must, however, be practical first and scientific afterwards, and when we have science engrafted on to practice we have the particular form of combination that can more than hold its own even in these years of depression. The aid that science brings to agriculture is practically co-extensive with the subject. Without being actually of more importance in the department of manuring, its assistance is there most easily demonstrated. Suppose that a farmer with a scientific training—or with the particular form of mental attitude that is the result of many years of private study and intelligent observation—enters on a new farm, he will at once set himself to ascertain certain things with regard to its capabilities. He will, to begin with, draw upon his own experience, or upon the experiences of others with which his studies have made him acquainted, and by the aid of his knowledge of the principles of manuring he will come to a determination as regards the probabilities of the case. By means of well-conceived yet simple field experiments he will proceed to test the soundness of the conclusions at which he has arrived, and by the end of the first season he will know in which elements of plant-food his soil is most deficient, and he should also be aware of the approximate quantities of fertilizers that he may make use of to give the maximum return consistent with profit. Farms vary markedly as regards the amount of manure that may be used with advantage, and until this amount has been approximately determined, profits cannot be at their maximum. Farmers frequently commit the error of thinking that they are doing the best for themselves by expending but little on fertilisers, and by resting satisfied with such crops as the natural capabilities of the land can produce. It is true that these crops are raised at a small outlay of capital, but if the value of the produce per acre can be increased to the extent of 30s. by an expenditure of £1, it is evident that the extra expenditure has been highly profitable. On the other hand, it is easy for a farmer to exceed the profitable limit of outlay, in which case



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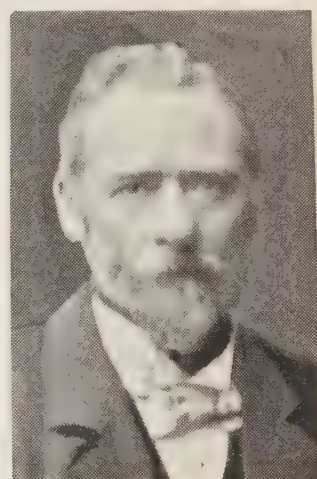
M. TRYON.
Govt. Entomologist.



E.H. RAINFORD.
Instructor in Viticulture.



H. NEWPORT.
Instructor in Coffee Culture.



WM. GOUTTER.
Inspector of State Farms.



J.C. BRUNNICH.
Chemist, Dept. of Agriculture.



C.J. POUND.
Govt. Bacteriologist.



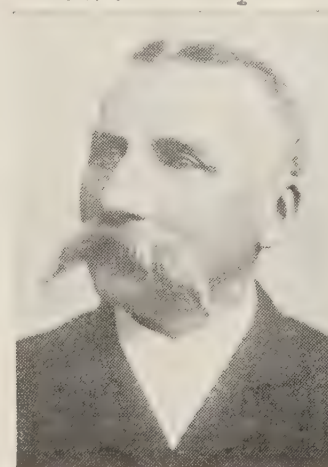
W.C. QUINNELL.
Govt. Veterinarian.



F.M. BAILEY.
Govt. Botanist.



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D. JONES.
Fruit Inspector.

the expenditure of £1 may return only 15s. Sometimes in field-experimental work one finds that previous years of lavish treatment have brought the fertility of the land up to such a pitch that one gets practically no response to the application of manures. In such a case the yield per acre is at or about its absolute maximum as regards quantity, but it is evident that it must be far below the maximum in point of profit. Farmers whose land is in this high condition are usually regarded as models for a district, but as "profit" must be the sure test of success in any industrial occupation, it would seem that men who farm too "high" may miss their mark by as much as men who farm too "low."

Not only will an educated farmer utilise scientific method to enable him to determine what elements of plant-food—and in what quantity—are required for his land, but he will be in a strong position to buy his materials to the best advantage. In his case there is no need to purchase "special" manures, unless their ingredients and chemical composition show that they are first-rate value. Not only can he prescribe for his own particular requirements, but his knowledge of chemical substances will often enable him to obtain nitrogen and phosphates from out-of-the-way sources at a much lower price than the market rate for standard articles. To some extent now-a-days co-operative purchase under the advice of an expert safeguards the farmer against serious mistakes, but in this case he is also availing himself of the assistance of science, though at the same time he is losing the many advantages that pertain to free individual action.

Similarly with regard to the aid which chemistry brings to many other departments of agriculture, enabling the farmer for instance to buy foodstuffs economically and utilise them to the best advantage. Botany, in its applications to agriculture, has done much and it can do still more. It has made us familiar with the life-history of plant diseases, and, as a natural sequence to a knowledge of the life-history, there follows the discovery of preventive and remedial measures. It has demonstrated the existence of an advantageous association between certain of our cultivated crops and minute organisms in the soil, and, as the outcome of this discovery, the organisms have actually been put upon the market as an article of commerce. In the past, agriculture has had to thank botany for all the improved varieties of plants that are cultivated in our fields, and the production of new and improved varieties is a line of research that can never be exhausted.

* * * * *

A man who has been through a course of training in mechanism and applied mechanics, such as is offered by the Cambridge lecture rooms and laboratories, cannot altogether dispense with the experience of the shops, but most employers now recognise that he will learn more in an apprenticeship of two years than another youth will learn in four. Similarly in the case of the young agriculturist. Somehow or other, if he is to practise his art intelligently, he must become familiar with rotations, with the quantity of seed and manure to use under varying conditions, with the factors that determine *quality* in seed and in produce, with tillages, rations, characteristics of stock, profitable distribution of capital, economic utilisation of labour, and with the many other details that collectively constitute the fabric of his art. It is not to be denied that many farmers have mastered all these details without undergoing a course of formal study, but it is also equally true that systematic education would have placed them in the same position in a much shorter time, with less risk, and at a lower cost.

* * * * *

According to my experience nothing of an educational character interests farmers so much as these trials (local field and feeding experiments). Started many years ago by the two great national Agricultural Societies of England and Scotland, this work was subsequently taken up by some of the local Societies (for example, the "Bath and West," and the Norfolk Chamber of Agriculture), and more recently it has formed an important part of the

programme of the agricultural colleges. On the whole the local trials have proved most useful, as much also by their negative as by their positive results. In many cases they have confirmed practice, while in other cases they have shown that established custom may with advantage be widely departed from. It need excite no surprise that it is the best farmers who give most attention to the results of such experiments and demonstrations. There are certain farmers whose dignity and reputation are of the order that will not suffer them to set foot on an experimental area, to breathe an atmosphere that savours of science. There are others, no less practical, who take advantage of all the teaching that experiment and science have to offer, and it is to the support of these men that agricultural education owes so much.

We regret that we have not space to reprint the whole of Professor Somerville's most interesting lecture, but we think enough has been given to show the fallacy of the idea that

ANYBODY CAN FARM.

FIRST STEPS IN AGRICULTURE.

FIRST STAGE.

4TH LESSON.

BY A. J. B.

You must not run away with the idea that everything a farmer sows in the ground will be sure to grow nicely and yield him a good crop. There are a great many enemies which the plant has to fight against, and it must conquer them all, because, once these enemies have beaten the plant, the poor thing can never rise up or gain strength to fight again. At every attack it gets weaker and weaker, and at last, if no help comes, it must droop and die. You know that a small band of soldiers has often been surrounded by such a large number of the enemy that there seemed to be danger of their all being killed. Then a strong body of their friends has appeared, and together they have attacked and beaten off the enemy, and the first little band was saved. Now, just suppose the plant to be in the place of the little band of soldiers. The enemy comes along in the shape of caterpillars and other insects, and they begin eating up the leaves or fruit or blossoms, and some stick to the stem, others to the roots, others again to the leaves and fruit, and as fast as the poor plant is drawing in its food by the roots and leaves, the enemies are sucking it out through the stems, branches, and leaves. Then the farmer comes along to help it and kill and drive off these enemies, and he does all sorts of things, which you will understand by-and-by, to destroy them, and all the time he keeps giving the sick plants medicine, just as you get medicine when you are sick, till at last he has beaten off the enemy, and the plants are once more vigorous and strong, and yield their fruit at the proper season. You will learn all about these enemies, and their names, and how they kill the plant, and how the farmers got rid of them later on. Meanwhile, there are other enemies these unhappy plants have got. Why, if you knew all that seeds and plants and crops have to fight against, you would wonder how any green thing could possibly live to ripen its fruit. Frost is a great enemy of some plants, but it is also an enemy to insects, and kills millions of them. When a frost comes on very early in the season, or, worse still, very late, the farmers sometimes lose their crops or a great part of them. There were two or three hard frosts in the South of Queensland in 1899 which came when all the wheat fields were looking beautiful and promised to yield a very large crop. The wheat was just in the ear, when the grain is soft and milky. Then these terrible frosts froze the ears of the wheat, and killed them, and many farmers did not get a sheaf of wheat to thresh. They cut it all down and made it into hay, and built it up in big stacks waiting for someone to come and buy it. That was what an "unseasonable" frost did.

Then there are floods. Most Queensland boys and girls know what harm floods do. Some of the best and richest lands on the east side of the Main Range are situated along the banks of rivers and creeks. After heavy rains lasting for a long time, the land cannot soak up any more water, and it pours into the creeks. These run to the rivers, which cannot carry away the water as quickly as the creeks pour it in, so it spreads over the low-lying land, and farmers have often had so much water on their farms that they have been obliged to leave their houses in boats and camp on high ground until the water had run off, and then they had nothing left of all their crops and had to begin again.

If too much water is a bad thing, too little is much worse. As you already know, plants cannot live without water, neither can animals. So when many weeks or even months or years have passed without any heavy rain, the grass and water disappear, dried up under the hot rays of the sun. Where there is no grass sheep and cattle cannot live. Where there is no rain the crops will not grow on a farm. And so all animals and plants suffer, and thousands of animals die as soon as the plants have died. Thus you see a "drought," as it is called—that is, a long period without rain—is far worse for everybody than a flood. A flood does not remain on the land more than two or three days, and there is always plenty of grass everywhere in rainy weather. So perhaps a few cattle and sheep are drowned and all the crops are lost, but the farmer soon sets to work and puts in a new crop. And this is one of the great advantages which you possess of living in Queensland. You can grow some crop all the year round. Supposing that big floods were to carry away all your corn crop in February, that is, the ripe corn that you were just going to pull and carry to the barn. In some countries you would have to wait a whole season before you could sow anything again. You would have to wait till all the snow and ice had gone before you could plough your land; and all the wheat, which, in cold countries like England, Germany, and North America, is sown just before the snow falls, so that the snow may cover it up and keep it snug and warm till the warm springtime, having been swept away by the flood, you would have lost the wheat season and could plant nothing for at least four months. Here in Queensland, if a crop is destroyed, you at once put in another, either of the same kind or something else. If you have lost all your crops in February, you can begin to plant potatoes in March, and then you can next month plant acres of onions and cabbages and other things. So that a flood is not nearly so bad as a drought.

Very often a careless farmer gets a bad crop because of his carelessness. Let us consider the question of seeds. A poor shrivelled seed, even if it has strength to grow, cannot produce a fine vigorous plant, and anyone who sows bad seeds is a bad farmer, and ought not to be pitied by anybody because his crops are poor. Did you ever see a farmer sorting out maize for seed? What did he do? Either he spread the corn on the table and picked out all the largest and best shaped flat grains, or he took the best looking cobs and broke off the tops and bottoms of them where you often see single, round, little grains. Then he threshed the grain off the rest, and so obtained the largest seeds. That is what a careful farmer would do. But I have seen a farmer take corn for sowing out of a full sack without caring whether it was round or flat, or broken, or withered. Such a man could not expect a good crop, and he would never make a successful farmer, because, remember this: "If a thing is worth doing at all, it is worth doing well." And when a man, or a boy, or a girl does one thing badly owing to laziness or carelessness, they will in all probability be as lazy and careless about all the rest of their work, and so such people had better go and chop firewood, if anyone will keep their axes sharp for them, because they will never make farmers. Why, you may not think so now, but farming requires more headwork, and more careful work, and more reasoning things out, than driving a locomotive engine! And farmers should learn all they can by reading plenty of books on agriculture, and they should get all the best machinery, and buy the best implements, and the best horses, cattle, pigs, and sheep, if they mean to succeed in their business. It used to be the fashion

to look down upon farmers as ignorant men; but nowadays the farmers are looked upon as the most intelligent of men, and the greatest men not only farm themselves, but they hold the farmers in the highest respect.

Our late beloved Queen Victoria was a most successful farmer, and so also is King Edward the Seventh. Thus, no boy or girl need be ashamed to say, "My father is a farmer," because being a farmer means to belong to a profession which requires as much learning as, aye, and a great deal more, than to be a soldier, or a schoolmaster, or a clergyman.

Well, I have gone a little off the subject, but still you have quite enough to remember in this lesson, so I shall now give you the usual questions to answer.

Questions on Lesson 4.

1. Why may the farmer not obtain a good crop from everything that he sows or plants?
2. What have plants to fight against?
3. How do they overcome their enemies?
4. State some of the enemies the farmer has to overcome?
5. What name is given to a time of long-continued dry weather?
6. Which state of weather causes most loss to a farmer—long dry seasons or very wet ones?
7. State your reasons for thinking so?
8. Why is a Queensland farmer more fortunate in the seasons than, say, a German or Scotch farmer?
9. What happens if a farmer is careless in selecting seed?
10. How would you select maize seed?
11. Why should you be proud to be called a farmer's son or daughter?

FIRST STAGE.

5TH LESSON.

So far I have told you very little about seeds, but a farmer must know all about the seeds he buys or produces. He must be able to judge whether they are living and whether they are such as will produce a good plant. It is also very necessary to be sure that they are not mixed with other seeds. In Lesson 1 I explained to you how even useful plants become weeds whenever they grow with a crop which requires all the ground for itself. Thus you learned that oats may be looked upon as weeds if they grow up in a wheat field. The farmers on the Darling Downs do all they can to get rid of these "strangers" as they call them, because if they ripen and are harvested with the wheat, the miller will not give such a good price for the grain as they would if it were not mixed with oats. Seeds are very often destroyed by little tiny insects. They bore a hole in them, and eat that little living part which you remember is called the "germ." If the germ is destroyed, the seed cannot grow, and all the farmer's labour and expense will be lost if he is not careful to get good, fresh seed. But how is he to tell whether they are good and fresh? Look for yourselves. Here I have a packet of one kind of seed, and here is another of the same kind. One is very old, the other is quite fresh. Now examine each lot of seeds carefully, and try to find out which is good, and which is bad. You point out the dusty lot, and say, that is bad? You are quite right, but how do you know that I did not put the dust into that packet? You think the seeds in it look duller than those in the other packet, and they feel lighter than the other. Now, without my telling you how to distinguish the bad seed from the good, you yet have done so. You see, therefore, that by making use of the intelligence God has given you, you can make a little discovery like this. If, as you grow older, you continue to use that intelligence, to keep your eyes and ears open to learn from others who have studied many things belonging to agriculture, you will not fail to be successful farmers. But there is yet another way to tell whether the seeds are bad or

good. You noticed the dust? Well, I did not put that dust there. How then did it make its appearance? Examine a seed carefully. What have you found? Oh! so your sharp eyes have found a tiny hole in several of the seeds. How did the hole get there? Did I make it with a pin? No, it was done by an insect, and now you see that the dust is caused by the insect devouring the germ of the seed, and masticating and digesting its food. The dust then is composed of the remains of the inside of the seed.

You told me that the seed in one packet felt lighter than the seed in the other. Let us see if that is so, but first we will blow away the dust. Here is a small pair of scales. I place the seeds of one packet in this scale. Now drop the others into the empty scale. What happens? You notice that one scale is still resting on the table and the other is raised in the air. That shows you, that although there are exactly the same number of seeds in each packet, yet one lot is lighter than the other and therefore must have lost something. That something is the life of the seed—the germ. I will give you one more proof of the lightness of the bad seed. Here is a cup of water. Throw a dozen grains of the good seed into it. Observe, they have all sunk at once to the bottom. Now throw in the same number of bad seeds into the water. Notice that only a few sink, but most of them float. An experienced farmer or gardener would not take all this trouble with his seeds, because, by merely taking a few in his hand and examining them, he can at once decide whether they are good or bad. And when you are old enough to leave school and begin farming for yourselves, you will soon learn to distinguish the good from the bad.

You have perhaps heard someone say: "Oh! I will save the seed of such and such a flower, because it is so beautiful." Of course, if any plant is allowed to go to seed the seed may be gathered and saved. But many people, particularly flower gardeners, who do not grow flowers to sell, keep cutting off the flowers to put them on the table, or to give to their friends, until the blooming time is nearly over, and then they allow the very last flowers to go to seed, and this seed they save. When it is sown in the following year, they are very much disappointed to find that they do not get nearly such fine healthy plants, nor such splendid flowers as they did from the original plant; and they wonder why this is so. The reason is very simple. As the plant approaches the end of the season, the flowers are not so strong and large, and when they go to seed, the seed is very small and weakly, because it had not sufficient nourishment supplied to it from the soil by the dying plant. Therefore, bear this in mind: Let the best plants and best flowers produce the seed you wish to save. When a wheat-grower wants to produce a new kind of wheat of which he has only been able to get a few pounds weight, he carefully sows it in rows at proper distances apart, and keeps it nice and clean, and waters and tends it until at last it ripens. Then he goes through it and selects the very finest heads with the best-filled grain, and saves these for next year's crop, and by-and-by, instead of a few pounds weight, he has several thousand bushels of fine wheat. Had wheat-growers kept on growing wheat from their own fields year after year on the same ground, the wheat would gradually have become smaller and the grains fewer and pinched up, till at last it would not have been worth growing. But in all wheat-growing countries, there are people who make it their business to improve the wheat and make it more valuable for food. However, it will be many years before you will understand how this is done, and I merely mention it to you in order to impress upon you the great importance of a careful selection of seeds.

We were talking about holes being bored in seeds by insects, but there are a vast number of holes in the skin of the seed, just as there are thousands of holes in your own skin. These holes are called "pores," and it is through them that the moisture of your body passes out when you are very much heated. This moisture is "perspiration."

The holes or pores in the seed, are there for the purpose of enabling the seed when it has been grown to take in the amount of water required to make it swell and grow. In the dirty seed, these are stopped up and the seed will

not grow properly, if at all, for want of the water which cannot get in at the closed-up pores. It is precisely the same with your own pores. If you do not keep your skin clean and thus open the pores, the moisture within you which wishes to pass out as perspiration cannot do so, and you will soon find that you do not feel so healthy and strong as you would if you regularly bathed and washed.

The depth at which to sow seeds depends entirely upon the kind of seeds you are sowing. Some require to be barely covered with a thin layer of fine, soft soil, others should be planted at a depth of from $\frac{1}{2}$ an inch to 3 or 4 inches. But this you will learn when you begin to study the methods of sowing and planting adopted in different parts of the State.

Questions on Lesson 5.

1. Why should a farmer be a good judge of seeds?
2. In what way may seeds be destroyed?
3. How are you able to tell whether seeds are good or bad?
4. By what experiments can you determine the weight of seeds?
5. State the wrong and the right methods of saving seeds.
6. How can wheat seed be improved?
7. What are the natural holes in the skin of seeds called?
8. What is the object of these holes?
9. What would happen if the holes are stopped up with dirt?
10. At what depth should seeds be sown?

THE UTILISATION OF CORN-STALKS.

Roughly speaking about 400,000 acres of the Commonwealth's farm lands are annually put under corn (maize). The crop is either grown for grain or for fodder. Where the grain has been harvested, the corn-stalks are gathered up and burnt—rarely ploughed in. An acre will produce about 2 tons of stalks. Never yet has anyone come forward in Australasia with a scheme for utilising them, consequently we have been annually destroying probably 600,000 tons of a product which is of such market value that it brings readily 12s. 6d. per ton in America. Our 600,000 tons thus represent £375,000 absolutely thrown away. If this amount were divided amongst 10,000 growers of 40 acres each, £25 would be added to the value of the corn crop on the 40 acres, so that the grain which is worth say £240 would thus become almost clear profit, as the price of the stalks would cover nearly the whole cost of cultivation.

What is it that makes these stalks so valuable? This is how *The Foreign Buyer* explains the matter:—

It has probably never occurred to the farmer who has been throwing corn-stalks away as waste for ages that these would ever be put to profitable use. Nevertheless, such is the case, as will be demonstrated upon the completion of the third cellulose plant in the United States, and the second largest in the world, now being constructed at Linden, Indiana. Over £20,000 has been expended in the mechanical equipment, and when in full operation the plant will employ 100 men. Then the apparently useless corn pith will be put on the market as a protection for battleships of all nations, as a smokeless powder, dynamite, and other high explosives; as varnish, kodak films, car-box packing filler, waterproof cloth, linoleum, fine art paper, imitation silk, patent leather finish, face powder, silicate packing, and endless other, as various forms of which the farmer, or even a more scientifically inclined person, never dared to dream.

The plant now in construction at Linden includes all of the plant which has been operated at Rockville, Ill., to which has been added enough to make the new twice as large as the old concern. Both of the other plants in the United States are owned by the same concern—namely, the Marsden Co., a 50,000,000 dollar Philadelphia syndicate, which controls all the patents covering the processes. They are located at Owensborough, Ky., and West Point,

Va. The former plant will probably be erected this year at Peoria, Ill. It is estimated that over 16,000,000 tons of corn-stalks have annually been going to waste, and the successful attempts of this trust to rescue this waste makes stalks worth 12s. 6d. per ton, and thus in the next twenty years will increase the income of farms £5,000,000 by producing cellulose, dynamite, glue, cardboard, paper, and many other saleable products. In this may be found an extenuating argument in favour of one trust at least. Eighty million acres comprise the annual average of corn area in the United States, each acre yielding an average of about 4,000 lb. of corn-stalks, or a total of 160,000,000 tons. Of this weight 85 per cent., or 136,000,000 tons, is valued as feed, but not over 10 per cent. of it is actually fed. The other 15 per cent. of the total weight, or 24,000,000 tons, is the pith of the stalk, which has been a total waste. The patents held by the Marsden Co. cover the process of separating the pith from the stalk, which makes it not only possible but profitable for them to pay 12s. 6d. per ton for the stalk, and produce the raw material, worth 8½d. per lb., or £70 per ton. If every ton of stalks in the United States could be handled, the value of each corn crop would be increased £100,000,000. The proprietors of the Marsden Co. expect to see the time when these conditions will exist.

As for the products of this once useless corn pith, the outer lining, that part that encloses the pith, will be made into flour as an adulterant, cattle feed, chicken fattener, and egg-producer. Part of it will be made up into candy, into colouring dyes, and still other elements will become a part of more novel productions. Thousands of dollars will be added to the crop receipts of Indiana farmers. That which has been waste will be consumed, and employment will be furnished for skilled workers.

MULES FOR FARM WORK.

The mule has never taken on in Australia as a draught animal on the farm in preference to the horse, yet in the United States and in Latin America it is very largely employed both for quick and slow work. A writer in the *Tennessee Farmer* gives some good reasons for the employment of the mule on the farm. "What," he asks, "is a mule fit for?"

The question is so often asked by farmers who have never used mules on their farms, preferring horses, that we shall give a few of the merits possessed by our long-eared friend.

The mule is an easy animal to raise.

He doesn't eat much as compared with a horse.

An energetic mule will make a trip quicker than a horse, though he may not go fast—the secret of his speed is his uniform gait, steady and persistent.

You hardly ever see a sick mule; he seems practically immune from the diseases which attack horses.

A mule can endure more hardship than a horse, will pull more in proportion to his size, and will "stay with it" longer.

A mule is easier "broken," or trained to work than a horse, and is more reliable after initiated.

If a team of mules runs away they look out for themselves, and though they may make some close turns and go through a needle's eye, so to speak, they usually come out unharmed.

We would rather plough corn with a team of mules than with horses; they break down less corn and turn around quicker.

Hot weather affects the mule less than the horse.

A good, honest business mule is worth, and will command, a good price any day in the week.

The usefulness of a mule continues longer than that of a horse.

The mule is not handsome, doesn't make a good roadster, isn't stylish, doesn't "do himself proud" if hitched to a fancy yellow wagon or cart, but what he lacks in appearance he makes up in actual usefulness on the farm.

BLANCHING CELERY.

The new celery culture does away, to a certain extent, with artificial blanching, but many people do not follow this method of close planting; while, moreover, some kinds of celery will not blanch, even with close planting, unless banked by earth, boards, or something of the sort. Earth is objectionable in many cases, while the use of boards is expensive and cumbersome if one's celery rows are somewhat extensive. The accompanying illustration shows a device that may be found useful. The cheapest of cotton cloth is bought and torn



into strips of the required width, when it may be hemmed upon a sewing machine. The whole, when dipped in a 10-cent. package of black dye, is ready to be tacked upon slender sticks, sharpened at one end. It is a simple and very easy matter then to place the strips of cloth along the sides of the celery rows, turning at the end and going back upon the other side of the row. Sufficient shade may perhaps be afforded in most cases without dyeing the white cloth.—*Farmer and Grazier.*

NOTES FROM PARAGUAY—COLONIA COSME.

Our readers will doubtless remember the exodus of adventurous Australians who, under Mr. William Lane, left this State a few years ago, to found a social colony in Paraguay. From time to time news has arrived detailing the difficulties and trials of the emigrants in a land of foreigners not too well disposed towards the English speaking race, whose system of local government materially differs from that obtaining in colonies and States under British rule, and who placed so many obstacles in the way of founding a prosperous settlement that, under less determined leaders, the whole scheme would long ago have been abandoned, especially as dissension arose amongst the settlers themselves. The Cosme Colony has, however, in spite of all privation and hardships, survived after a fashion, and probably, may yet become a thriving community, judging by a perusal of the *Revista de Agronomia*, a publication issued by the School for Agriculture near Asuncion. The Government is making great efforts to improve the position of agriculture in the Republic.

Mr. John Lane, of the Cosme Colony, to whom we are indebted for kindly forwarding the publication in question, says—

“Agriculture in Paraguay is in a very backward condition, in spite of efforts on the part of the Government to improve matters. The native Paraguayan is not the best material for Agricultural Schools and papers to work on. He really belongs to the ‘wooden plough epoch.’”

One direction in which the Government has been successful, is in the encouragement of tobacco culture and curing. This matter was taken in hand three years ago by the Banco Agricola (Government State Bank), which built *sacaderos* (drying-houses) in various agricultural centres, and offered regular and good prices for green leaf, the seed of which it supplied, together with full instructions for growing the same. The result has been beneficial in many ways. The native grower obtains *four times* the price for his crop than he did previously when he was bled by the middleman. The tobacco of this country has wonderfully improved in quality and uniformity. The Banco has reaped a handsome return for the capital expended, so much so that it is building more

sacaderos, and is asking the Government for a tobacco monopoly in order that the standard of Paraguay export tobacco may not be lowered by an inferior article being sent out by private dealers.

The Government has made less successful attempts to encourage coffee-growing. It supplies free plants and pays a bonus of 15 cents (one penny) per plant each year for the first two years planted. The great drawback to coffee culture is the slight frost which in some winters does considerable damage unless the trees are sheltered. Also, coffee in Paraguay does not ripen readily, which makes picking a protracted operation.

It is interesting to compare the rainfalls during the month of February for the period 1885-90 and 1894-99 in Paraguay, although a much more extended series of observations is necessary in order to effectively determine the average fall.

In 1885 total rainfall	...	239 m.m. = $9\frac{3}{5}$ inches	
1886	" ...	76	" = 3 "
1887	" ...	201	" = 8 "
1888	" ...	22	" = 1 "
1889	" ...	210	" = $8\frac{2}{5}$ "
1890	" ...	136	" = $5\frac{2}{5}$ "
1894	" ...	211	" = 8 "
1895	" ...	96	" = 3 " nearly
1896	" ...	138	" = 5 "
1897	" ...	8	" = $\frac{2}{5}$ "
1898	" ...	118	" = $\frac{1}{3}$ " nearly
1899	" ...	194	" = $4\frac{3}{4}$ " nearly

At Cairns (Queensland) the rainfall for the month of February fluctuated in a remarkable manner, as the following figures will show:—

1899	... 10.97 inches	1901	... 22.09 inches
1900	... 1.98 inches		

The year 1900 was very dry all over Queensland, disastrously so in the Western districts, but the average fall in the Northern coastlands is considerably in advance of that of Paraguay, when only once in twelve years did the February rainfall reach over 9 inches.

THE USE OF SORGHUMS.

The use of the sorghum as a forage plant is rapidly increasing in all countries which are semi-arid or subject to frequent long summer droughts. As the use of the plant increases there is an increasing desire to use it as pasture, but there is a reluctance to do so from the fact that there has sometimes been a loss of stock fed upon the growing plant which could not be accounted for upon the theory that death was caused by ordinary bloat. While these cases have been rare, yet they have occurred, and the cause is not yet known. The Nebraska Experiment Station has been thorough in its investigations, but so far has learned nothing. Samples of sorghums which had killed a cow within a few minutes after eating it, disclosed no trace of any poisonous substance when analysed a few days later. The station authorities are forced to conclude that sorghum sometimes, when growing or freshly cut, contains poison which soon disappears in the process of curing, so that by the time the samples reach the laboratory and are analysed they are harmless. There is at any rate no danger in feeding cured sorghum, and a great deal of sorghum is pastured with no injurious results, and yet the fact that deaths not from bloat have sometimes occurred from its use makes it an undesirable pasture crop until we know more about it. It is suggested by the station authorities that in cases where poisonous effects followed its use, the plant itself was probably unhealthy and yellow, but there are not sufficient data on that point to justify a very strong opinion.—

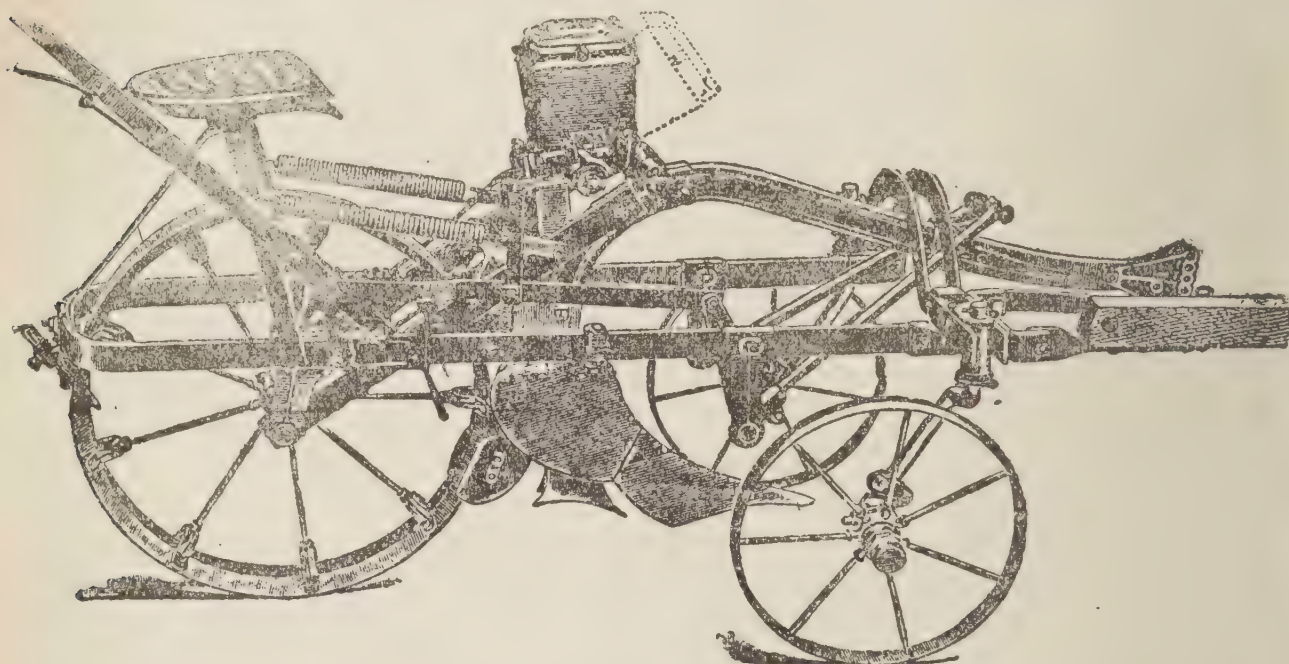
Weekly Chronicle.

A LABOUR-SAVING CORN-PLANTER.

Now that other agricultural countries possessing a suitable climate are devoting their attention more generally to the cultivation of corn, the implements employed for this purpose in the United States, where corn is a standard crop and the means of cultivating it have been brought to a high degree of perfection, are attracting much more attention abroad.

The "Lister" is one of these implements used by all growers of corn on a large scale, and the accompanying illustration shows the "Little Injun Lister," made by the Rock Island Plough Company, and known as an efficient and economical single-row planter.

The high lift principle, as may be seen in the illustration, has been adopted in this implement, accompanied by two bails, which permit the raising of both ends at the same time, and the whole performance of the implement is directly under the eye of the operator. Another feature of importance is its great



steadiness in all kinds of soil. The beam is controlled by the bails attached near the ends, which holds the bottom rigidly to its work. By means of two covering shovels a thin layer of loose dirt is deposited upon the corn as soon as it is dropped, while the rear wheel follows immediately, pressing this soil about the kernels, thus making an ideal seed bed. It is a very light draft machine, three horses being all that is necessary under any conditions, and it can be used either with or without a pole.

A similar implement, the "Big Injun Lister," for planting two rows at once, is built by the same concern and does double the work with the labour of an additional horse. Both are well and favourably known in corn-growing sections in the United States and other countries; they have been severely and successfully tried in every condition of soil, and they represent the latest development in implements of this class.—*Sydney Mail*.

HORSE-CLIPPING BY MACHINERY.

Of new inventions destined to relieve man of heavy and tardy manual labour there is a never-ending succession. Singly or in battalions, ingeniously contrived new machines for field, barn, station, or stable are daily placed in the market.

Last week we had the pleasure of seeing work done by a novel machine, which is as effective as it is rapid in its work, whilst its construction and manipulation are simplicity itself. This is a hand-driven horse-clipping machine, the only one, we believe, as yet in use in Queensland. It is an American



HORSE CLIPPING BY MACHINERY.



AN IMPROVED TIP-WAGON.

invention which has not long been placed on the market. From what we saw of its work we should say that the days of hand-clippers are over. The horse shown in our illustration was completely and cleanly clipped of a thick coat of hair in thirty-five minutes. With the hand-clippers the work would have taken from two and a-half to three hours. The owner of the machine, Mr. H. Edwards, when in Melbourne, had the good fortune to meet with one, and the wisdom to invest £13 in its purchase. In April last he and his assistant clipped eighteen large dray horses belonging to the Perkins Brewery Company, and the work only occupied two days.

In construction it is very simple. The driving-wheel, which is 15 inches in diameter, is pinioned, and works into a small pinioned wheel, as shown in the illustration. Thus the knives can be driven at a high speed if necessary. There is also an arrangement called the balance-wheel, which makes the machine run steadily and smoothly. In the sheep-shearing machine there is a universal joint which enables the operator to work it at any angle. The cog-wheels of the joint connect the two first parts of the shaft, and the other two parts are connected by a second universal joint, whilst a third joins the handle which contains the knives to the shaft. Used as a horse-clipper, this shaft is done away with, and its place is supplied by a chain shaft. This is enclosed in a flexible indiarubber tube. The handle is hooked on to the end of the shaft, which can be drawn forward for the purpose. The construction of the comb-plate is such as to obviate any danger of cutting an animal. In the old style the plate is flat, but in this machine it is slightly convex on the side touching the horse; the points also are rounded. For adjustment there are two thumb screws, hence no spanner is required. As will be seen in the cut, the machine is worked hanging to a rope fastened to a beam overhead. This arrangement enables the operator to move to any part of the animal without shifting the machine. The labour of driving the machine is trifling, the assistant working continuously for a quarter of an hour with no fatigue. Most farmers know the labour required to drive a hand corn-sheller. This machine is little more trouble to drive than a sewing-machine.

Although so admirably adapted for horse-clipping, we understand that it is quite as effective and speedy as a sheep-shearing machine, an expert hand being able to shear close three or four sheep in the time taken to shear one by the old plan.

The makers and patentees are the Chicago Flexible Shaft Company, U.S.A.

IMPROVED TIP-WAGON.

Inventive genius is usually credited to the American people, particularly in the matter of agricultural implements and in general appliances for the saving of labour. It is, however, pleasing to note that the Australian mind is quite as capable of evolving new ideas, and of giving to the world new inventions in science, art, and mechanics which are second to none in their own class. Queensland inventors have produced several valuable labour-saving machines, and amongst rolling-stock the latest comes to us in the shape of an improved tip-wagon, manufactured by Mr. W. H. Jackson, of Toowong. By the way, Mr. Jackson was also the inventor of a new kind of plough, which he called "Jackson's plow," using the American form of the word plough. One day a farmer called on a firm of implement makers with the idea of purchasing one, having heard much of its good points. He was referred to Mr. Jackson, who said he had not got one in stock, but he would get him one. "Get me one!" said the would-be buyer. "Do you think I can wait till you get one?"

"But," said Mr. Jackson, "You can have it in a week."

"In a week! How on earth can you get a plough from America in a week?"

"It is not an American plough," Mr. Jackson explained. "It is made by myself."

Upon this, the farmer's face fell, and evidently his ideas as to the value of the implement had fallen by 50 per cent., as the thing was a colonial invention. Verily, no man is a prophet in his own country.

To come back to the wagon. The Booroodabin Divisional Board Sanitary contractor was so struck with its simplicity and effectiveness, that he placed an order with the maker for a wagon such as is here illustrated.

Its purpose is to carry away the city refuse with a minimum expenditure of labour, but it is also available for any other carrying purposes, and thus would be suitable for use on the farm or sugar plantations, &c.

The driver's seat is in front, where he has full control over the horses and the brake. When he has arrived at his destination with his load, he goes to the near side of the wagon, and raises a lever. This action unlocks the body from the carriage, and also releases a winding winch. Then, by turning the handle A, the body slides back to its centre by means of a roller and chain, then tips up slowly or quickly at the will of the man at the handle, and discharges its load with ease. As soon as the body of the wagon is empty the driver reverses the action of the handle, and this brings the body down to a horizontal position, and at the same time winds it forward into position, when it locks itself firmly as if bolted down, and is then all ready for its next load. The body of the wagon is furnished with four lids to cover the top to prevent any nuisance from escaping odours. It is calculated to carry four square yards of material, and is easily drawn by two horses. The emptying process only occupies a few minutes. Such a wagon should find great favour with any persons whose business requires the shifting of material of any kind. It should be noted that any other design of body or under-carriage can be fitted with the tip arrangement to suit any kind of work.

NOTES ON CO-OPERATION FOR FARMERS.

No. 2.

By FRED. W. PEEK, Loganholme.

At all conferences held under the auspices of the Department of Agriculture since their initiation, papers have been read on the subject of co-operation as applied to, and for the benefit of, those engaged in the agricultural and pastoral industries of this State. Such papers have generally given rise to a fairly interesting discussion by the members present; and whilst those representatives of farming centres—men who handle the plough, reap, and mow, work from daylight to dark to make ends meet—have given every attention to the advanced ideas promulgated by those having a keen interest in the betterment of the social condition of our producers, yet there have been naturally a few opponents to the schemes advocated by some of those present who represented societies, and who, by the tenor of their discourse, would be largely composed of business people, or representatives of those societies whose principal function is an annual show or a carnival got up for pleasure, sport, and profit of the promoters, for the benefit of the townspeople first, the farmer being the last to be considered. From such people, at conferences, we are bound to get varied opinions; their expressions of sympathy, or of distrust being given accordingly as their interests may be affected financially or otherwise by the subject under discussion. So it is when co-operation is brought forward as a means of elevating the agricultural industry, obtaining better markets, &c. A few malcontents are always ready with their pessimistic views to predict failure and non-success, these views chiefly coming from those whose interest lies in keeping things as they are, and by which the army of agents, dealers, and middlemen can still continue to flourish and thrive on the labours of our farmers and producers.

How long will the farmers continue to ignore the benefits that have been derived all over the world by the co-operation of producers? A move has been made in this direction in this State by the initiation of central mills, creameries, and butter factories, which are proving successful in a minor degree, yet we find opponents to the schemes for further advancement even amongst our

producers not amenable to reason, who will attend conferences and meetings, and because of a little parochial jealousy or petty feeling, will take side with the very individuals who are sapping the vitality of their industry. It only requires the producer to awake out of his lethargic sleep, to agree with his neighbours to combine to make the trouble of one the concern of all, to determine to do away with the rotten systems in vogue, and go in for co-operation pure and simple. My advice is: Establish your own centres, place them in the hands of reliable trustworthy men, who will be your servants not your masters; then the markets would be better regulated, the consumers would buy direct—thus ensuring a better return to the producer, who would in his turn be enabled through his co-operative agency, of which he would be a member, to purchase direct and at cheaper cost such articles as he requires for his own use, seeds, implements, &c.—at not only greatly reduced cost, but of a more even and better grade and quality.

WHY CO-OPERATION MUST SUCCEED.

So much has been written by myself and others in the past on the benefits of co-operation that, although I am but almost repeating myself, the speculative and unsatisfactory systems are so universally acknowledged in this State that I am impelled to still further do all that lies in my power to endeavour to cause our farmers to seriously take the question into their consideration. It may be said that it is useless to try to rule the market by the growers and producers. It will be argued that the agents are too keen, they are up to business, and that they will combine to check the co-operative movement. Such has been done, I am quite aware, even in our sister State of New South Wales, but although it was a severe fight at first, the co-operators came out triumphant, and to-day the Farmers' Co-operative Company of New South Wales is an institution as flourishing as it is useful, and has come to stay. The reasons why co-operation must succeed lie in these facts:—

- 1st.—The produce is the farmers'. He can have the say and the control of its disposal.
- 2nd.—That by organising and combining, the power is in the hands of the producer, and can defeat the combination of any dealers or agents.
- 3rd.—That if co-operation is based on sound equitable lines, it must succeed. Let the producers choose their own managers and directors from amongst themselves, and not commence operations by buying up a decaying business, taking the previous proprietor as manager.
- 4th.—That the charges for successfully working a co-operative business cannot be more than the present costly system of auctioneers, dealers, hawkers, middlemen, storekeepers and others, who each make a living from the toil and labour of the farmer before the produce reaches the consumer.
- 5th.—That the success which has attended co-operation in other parts of the world, in New Zealand and Australia is now awaiting an intelligent body of farmers in Queensland who will do likewise.
- 6th.—That success and better systems mean better financial results to the grower—a larger profit, and a just reward for his labour.

Further argument is unnecessary. By co-operation the legitimate profits arising from business transactions are retained by the producers themselves and are not transferred to a monopoly of agents. Let our farmers read and study the problem for themselves. "A house divided against itself cannot stand." The meeting together of those whose interest lies in the future development of our industries on sound lines; co-operating—acting in union; the appointment of organisers to travel through our country districts, educating our farmers into better systems of preparing and marketing our products; the establishment of depôts in various centres, with a sound central management in touch with the Agricultural Department; in these factors lies the solution of one of the farmer's chief difficulties of to-day.

MOREHEAD'S, LIMITED, WHEAT SALES.

The third sale of wheat was held on 8th May, at their Wheat Exchange, by Messrs. Morehead, Limited, when a catalogue of 1,837 bags of good milling wheat was submitted. There was a large attendance of buyers, and bidding was spirited, and 1,207 bags sold at satisfactory prices, equal to $\frac{1}{2}$ d. per bushel advance on last sale, while offers closely approaching owners' reserves were made for the balance of the catalogue. Some of the parcels submitted were weevily, and others showed quantities of black oats. Several lots of Marshall's No. 3, Budd's Early, and Ward's Prolific, in prime condition, realised top price—2s. 7d. on railway, equal to 2s. 10 $\frac{3}{4}$ d. delivered in Brisbane. We sold, delivered at Nobby: 166 bags Allora Spring (showing weevil), at 2s. 6d.; 33 bags Marshall's No. 3, 2s. 6 $\frac{1}{2}$ d.; 55 bags Budd's Early, 2s. 6 $\frac{1}{2}$ d. Delivered at Clifton: 100 bags Marshall's No. 3, 2s. 6 $\frac{1}{2}$ d.; 70 bags Budd's Early, 2s. 6 $\frac{1}{2}$ d.; 260 bags Marshall's No. 3, 2s. 7d.; 60 bags Budd's Early, 2s. 7d.; 90 bags Marshall's No. 3, 2s. 7d. Delivered at Jondaryan: 163 bags Gluya's Early, 102 bags Marshall's No. 3, and 108 bags Ward's Prolific, 2s. 7d.

REMEDY FOR FOOT-AND-MOUTH DISEASE.

At Antofagasta, in Chili, thirty animals, said to be suffering from foot-and-mouth disease, have been slaughtered, and the Chilean Government deserves great praise for the promptness of their action. Not only were the cattle slaughtered, but the whole of their carcasses were immediately burnt. Special measures are being taken to prevent the importation of cattle from Argentina, and it is thus hoped that no further harm will result.

In connection with the above, it is gratifying to learn that at a recent meeting of the Academy of Medicine, Paris, Dr. Jarre announced the discovery of a remedy for the disease which is so fatal to sheep. He says he has successfully used the remedy in 1,500 cases in two years. It consists of a concentrated solution of chromic acid at 33 per cent., chemically pure. This is employed as a caustic to the sore. The cure is rapid and certain. Dr. Jarre says that M. Dupuy, Minister of Agriculture, has promised to give the remedy official tests.

MANURES FOR POTATOES.

Professor Wright, of the West of Scotland Agricultural College, has contributed to the journal of the Board of Agriculture an instructive article on experiments in the manuring of potatoes in Scotland, Yorkshire, and elsewhere. He points out that results have shown that when so heavy a dressing of farmyard manure as 20 tons per acre is used, artificials in addition give but a small increase in the crop, but that half-dressing, with artificials, gives about the same results. Thus, the average of five farms in Yorkshire in 1899 from 20 tons of farmyard manure was 10 tons 10 cwt. 3 qr., while 10 tons of the same manure with 1 $\frac{1}{2}$ cwt. of sulphate of ammonia, 6 cwt. of superphosphate, and 2 cwt. of sulphate of potash gave 10 tons 6 cwt. 3 qr. Similarly in one season, on nineteen farms in Scotland, 20 tons of farmyard manure gave 9 $\frac{3}{4}$ tons of potatoes, while half the quantity, with 1 $\frac{1}{4}$ cwt. of nitrate of soda, 4 cwt. of superphosphate, and 1 cwt. of sulphate of potash, produced only 3 cwt. less; and in the next season, on nine farms, 20 tons of farmyard manure gave 7 tons 6 $\frac{1}{2}$ cwt., while half the dressing, with 1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate, and 1 $\frac{3}{4}$ cwt. of muriate of potash, gave 7 tons 10 $\frac{1}{4}$ cwt. of tubers. The proportion of superphosphate in the Scottish trials seems to be more appropriate than the larger one applied in Yorkshire. Where farmyard manure is not available, a crop nearly equal to that of the heavy dressing was obtained in Scotland by the application of 6 cwt. of superphosphate, 2 cwt. of sulphate of ammonia, 1 cwt. of nitrate of soda, and either 2 cwt. of sulphate or 247 lb. of muriate of potash.

SCIENCE IN AGRICULTURE.

In the United States of America every effort is put forward by the Agricultural Department to advance the interests of farmers. The aid of the chemist is daily invoked to discover new antidotes to new diseases of plants, to suggest new methods of manuring and spraying crops, and to examine into the habits of every plant raised by farmers, market-gardeners, and horticulturists. The latest application of science to agriculture comes to us in the shape of the use of the cinematograph. This form of photography has, up to the present, only been utilised as a means of showing men, animals, and ships in motion. The Americans have, however, applied it to utilitarian purposes in connection with plant growth. Thus, moving pictures have been obtained of the daily growth of a plant by automatic exposures made at intervals of two hours. The slow growth of the plant is thus followed for two or three months. Besides this, it is thought that the development of fungoid and parasitic diseases may be so studied that the best time for the application of manures and sprays will be ascertained. It will be interesting to see the first set of pictures made by this agency.

DRESSING SEED BARLEY.

Many farmers decry the use of bluestone with seed barley. In the old country many are afraid to use it, but a correspondent of the *London Agricultural Gazette*, an experienced farmer, holds the opinion that dressing with bluestone is most beneficial. He uses 1 lb. in 6 gallons of water for every sack of 448 lb., stirring it round in a cistern for a minute or two, then lifting it into baskets to drain a little. It is then put on the barn floor, and in a few hours it is fit to sow. As to it hurting the barley, the barley makes a better start, and there is no black in it ever since he practised it. One farmer dressed 38 acres one year, and left 2 acres undressed; on the undressed, he said he could grip a handful of blackheads in a place, but the 38 acres were quite clean.

Dressed the same as wheat, 1 lb. to a gallon of water, it does not answer anything like so well as it does with 6 gallons to every sack and 1 lb. bluestone. The cistern is never emptied until the lot of seed is done. The bluestone is dissolved in boiling water.

THE SPARROW PEST.

The enormous increase in the flocks of sparrows which infest the city and its furthest suburbs, and the wholesale destruction of seed crops effected by them, cause us to materially alter our previously expressed belief that their insectivorous qualities more than compensated for the loss sustained by market gardeners and other horticulturists through their love of grain and succulent young plants. We have, ourselves, suffered so severely during the past three months from these birds that we unhesitatingly denounce them as being amongst our greatest nuisances. Mr. R. J. Cribb, of Milton Road Apiary, has been a severe sufferer in this respect, the sparrows having, amongst other depredations, destroyed a heavy crop of Kafir corn. The heads are practically denuded of seed, whilst the ground is covered with the husks of the grain. Mr. Cribb has also suffered other losses owing to the sparrows. It is about time that some united action were taken to diminish their numbers.

The shooting with pea-rifles indulged in by numbers of young people in the suburbs has not the slightest effect upon the survivors, and is positively a dangerous practice, unless shot cartridges take the place of the bullet.

We would suggest to those who are troubled with the sparrows, that they should take steps in the way of forming an association having for its object the destruction of these and other bird pests, and the encouragement and protection of insectivorous birds.

Dairying.

ANGORAS IN AMERICA.

We continue to receive requests for information about the Angora goat. As we have already given all we know and have been able to glean from other countries on the subject, it only remains to say that there are thousands of acres of rough hill country in this State which are utterly useless for agriculture or even for grazing, and which yet would be admirably adapted to the rearing of goats. Goats love hilly country. They are like the American mountain sheep, which is never so happy as when it finds a comfortable precipice over which it can bound itself, landing on its head many feet below the starting point, with the object of getting a bite at some favourite shrub which it has discovered. In a treatise on the Angora goat, by Mr. G. E. Allen, entitled "Starting in the Goat Business," we read—

"Geo. A. Hoerle, well known as secretary of the American Mohair Growers' Association, and himself an experienced and scientific breeder, is a firm believer in the Angora goat industry in the United States. There are very few States in the Union, says Mr. Hoerle, which have not millions of acres of brushy mountain land of next to no value located from an altitude of 400 to 500 feet above the sea level to 6,000 or 8,000 feet, depending much upon the latitude of the land, which would offer a perfect paradise to the Angora goat, and would, if stocked with these animals, be a source of ever increasing profit to their owners, and the amount of money which would be required would be so low, compared to the profits which could be realised by an intelligent caretaker, that the cost usually should not be in the way of anybody who wishes to engage in the enterprise.

"The farmer whose farm partly consists of scrub mountain land would have the advantage, and to him Angora goats would be entirely supernumerary, offering the greatest of chances for large profits. All he has to do is to fence a piece of land into two pastures, turn his goats on them alternately, sometimes in one, sometimes in the other; drive them out at daybreak and bring them back at sundown. If possible he should connect the pastures with his barn, where he should construct an open shed or hovel. Anything that will turn rain would be sufficient. Upon arrival at their roosting place, feed them on a little grain, and soon they will not have to be driven in any more, but be there in time for the sweet morsel.

"The owner of Angora goats should procure at kidding time two or three suckling pups of some strong breed of dog, but if possible with a strain of collie in them, and raise these three pups on a kidless doe (a common one would be preferable) until they are large enough to follow the goats. Such dogs will become so attached to the breed of their foster-mother that they will fight for them until death anything in the shape of four or two-legged curs that would venture near their charge, and be the most reliable of shepherds. Two or three dogs thus brought up with goats could be trusted with the management of a flock of sheep as much as two or three thousand, and with very little extra instruction would herd them as well and with as much sense of duty as any hired shepherd, and be far cheaper. I am often asked questions in regard to the cost of goats, and whether common goats or Angoras would pay best for a start.

"Common goats are not high in price, but the item of freight is considerable. This cost may be ascertained from the nearest railroad agent. It is only natural that for goats yielding very heavy fleeces very large prices should have to be paid, and of course also to the above prices the freight would have to be added.

"But the Angora goat industry must to-day be considered a very safe and at the same time very profitable investment, provided the personality of the

new beginner is suited to it, and if his means are adequate to his own personal demands or those of his family. The land is steadily increasing in value, and his stock is constantly improving. Thus his income as well as his property will steadily increase.

"The goat industry promises to furnish a solution of some of the problems which have baffled the best statesmen and sociologists. The utilisation of 265,000,000 acres of now worthless land is in itself a proposition which challenges the broadest comprehension. The worn-out farms of New England, never noted for superior fertility, afford a rich field for goat-raising, and the disheartened descendants of the Puritans may here find profitable and permanent occupation suitable to their impaired means and ambitions.

"Scrub lands are especially prevalent in southern localities where the lower negro element is thickest. Goat-herding would be an occupation more congenial perhaps to these indolent people than any other, while it might be a valuable factor in their regeneration. While skill is a good thing even in goat-raising, it is certain that unskilled labour is more available, and that the influence of the goat upon American social conditions may soon lead us to look upon this animal with appreciation. We may even understand why the goat was an object of worship among many ancient people."

SOW EATING HER PIGS.

PREVENT SOWS FROM EATING PIGS.

Many people fail not because they do not work hard enough and long enough, but because they do not have forethought enough to do things at the proper time. They neglect work that should be done, and do work that is necessitated by the lack of not having performed a certain duty in connection with that work. Take, for instance, the pig-eating sow. There are but a few farmers who think about a sow eating her pigs until after she fallows and begins to eat her pigs, then they rush about and try to find a remedy to prevent it, and it is usually too late at that time. Now that the sows are being bred for spring litters it is the best time to find a remedy for the pig-eating sow, and remember it during her pregnancy. The habit grows out of the craving for something that will supply the system of the sow with the element it has taken to produce the young pig, such as protein, potash, phosphates. A brood sow should be fed a variety, such as bran, shorts, roots, &c. Corn is fattening, and should not be fed in as large quantities as other foods. If you will study the nature and quality of the food you give the brood sow you can prevent her from eating her pigs, and at the same time have the pigs come more healthy than if you do not pay any attention to them. A brood sow should not be crowded—from three to four in one sleeping apartment is enough. Study the needs of your stock through the winter, and when spring comes if you have provided well for them you will not have half the trouble with their offspring that you would if you let them shift for themselves.—*Whinery's Swine Advocate*.

PIG-BREEDING FOR PROFIT.

AFTER FARROWING.

When the sow has been farrowed twenty-four hours she should have a walk round the yard, and if a nice day she may be left a few minutes to herself, but must not be allowed to lie down or get a chill, and if she dungs and makes water freely you can be sure that all is right. If not, however, trouble looms ahead, and you should prepare to meet it by giving her food warm, with some linseed and treacle, or 2 oz. of castor or cod liver oil. If the water is thick or high-coloured, give about as much saltpetre as will stop on a shilling once a day for two or three days, and it will put that to rights.

Sometimes a sow is very feverish, and the milk runs off. If so, give her a pint of ale in her food, or a few new grains in place of bran once or twice. A practice I have followed for some time has been to give a dose of sulphur once a week for a few weeks before farrowing.

Most important of all is it to have the sty warm and light, with plenty of fresh air blowing in. A good many people think the place cannot be warm and have fresh air, but it is necessary to have both, and fresh air most of all, but it must be remembered that the colder the weather the less ventilation is wanted. Raw, cold, damp fogs should be counteracted by burning a lamp or gas in the place if no other heat is about.

Having got the pigs on suckling and the sow to her food, all is going well, and with regular feeding on good nourishing food, and plenty of it, and keeping the bed and place generally dry and clean, all will go merrily. The sow should be let out from the pigs a few minutes every day, and after the first time or two will look for it at regular times, and the pigs can be let out with her when they are a month old, and they will be all the better for a scamper in the yard or field every day, no matter how cold it is, if it is not wet, and they are not allowed to remain out too long.

WHEN TO CASTRATE.

At six weeks old the hogs will be ready to castrate, and are better to be attended to then than later, as they suffer less, and sooner get over the job than when left till older. The sow should be given a few coals or cinders every few days. A good plan is to have some in the yard, so that they can help themselves to them as they require them.

As to feeding, nothing is so good as sharps, or thirds if you can get them pure from the wheat. Owing, however, to the demand, that is very difficult to do. Ground wheat is better, but costs a little more per pound, and I like to change the diet with a little barley or pea-meal occasionally, and any kitchen or dairy refuse that is on hand. If you are a dairy farmer, and have some milk, either new or old, that is the very best feed you can have for either mother or youngsters, and nothing you can mix will send them on like some good milk—new for preference, but old before none.

VALUE OF COD-LIVER OIL.

I use cod-liver oil, in doses of a wineglassful for four pigs up to two months old, twice a day, and find it very good in place of milk, and not very costly, and there is no difficulty in getting them to take it with their food. It is a really good addition to ordinary food for young pigs you want to send along.

The pigs now being ready to wean, the best way is to separate the mother from the youngsters during the day, and put them together at night for a few days, then take them away altogether. Keep the sow on "short commons" for a few days till her milk is dried up, then feed better for the next day or two, and she will be ready for the boar. Serve her on the second or third day of heat, and she is almost sure to be right. Then turn her out into a yard or field, where she can get plenty of exercise, and feed on any rough food, but do not give many turnips, as they are too watery and cold for in-pig sows; I rather like to give one good meal at night, and let her forage for the other, or feed on two meals of grains and a little barley or pea-meal if there is nothing for her to find for herself, but if run in a straw yard or grass field she will find a lot of her own food, or if a cottager's pig, the refuse greens from the garden will go a long way towards keeping her till within a month of farrowing again; then she will want as much as she will eat twice a day, as the young pigs will be telling on her.

Meanwhile the youngsters will have grown, and if well done will be strong growing pigs, and they should be fed twice a day with plenty of good rich food, and to get bulk, so as to fill their bellies, either some brewers' grains or boiled potatoes, or any vegetables will be acceptable, but do not make their food too

sloppy and thin, as it has to be condensed to solid again before it is any use to the animal in adding to the weight of meat ; but at the same time it will not do to have it too thick, and feeding pigs want it thicker than suckling sows.

KEEP THE PIGS GROWING.

If the feeding has been well done, and the pigs of a good feeding sort, they should weigh from 100 lb. to 150 lb. at eight months old, and then is the time to send them to the butcher, especially if one is short of room and near a town, as they make the most per pound then, and can always find a ready sale. If the feeding has been followed on from birth they will be plump, meaty pigs, and will weigh more and kill a better carcass of pork than pigs that are older that have been carried on as store for half their short lives. Store pigs cannot pay. They must be sent on for all they are worth from the day of their birth to the day they are sent to the butcher. If a dairy farmer, and having a lot of dairy refuse, it will be better to make them larger weight on skim milk, which makes a lot of bone and causes the pigs to grow more frame. I should make such pigs into small bacon pigs of, say, 150 lb. to 220 lb.

In the experiments of the Yorkshire College, cod-liver oil again comes to the top as the best means of adding the necessary fat to replace the more valuable cream removed from the milk. Large White Yorkshire pigs, or a cross of the Middle or Berkshire sows (with a Large White Yorkshire boar) is the best, I think, for feeding, but let the breeder beware of using the cross-bred pigs to breed from again, as it almost always spells failure to use half-bred pigs for breeding purposes.

Feeding pigs do not want a lot of exercise, but a few minutes' run every day—say, while the attendant sweeps out the sty—will do them a lot of good. It expands their lungs, empties their bowels, and acts as a tonic, and they go back to their beds and rest. I only feed once a day on Sundays, all pigs, except suckling sows, and then on the Monday morning I give a tablespoonful of sulphur to each full-grown pig, or one to four small pigs. I find it acts very well. It allows the pigs to get empty once in a while ; and it gives the attendant more spare time, and they do not seem so tied to the place as when they have the same work to do on Sunday as other days ; and I think the pigs are better for the change.

All pigs that are confined should have small coals or cinders thrown to them occasionally, or a good piece of turf put into the sty once a week, and in summer any green food is relished by them, and helps to push them on. All animals like a change of food, and pigs pay for a change as well as any other. I find it a good practice to give a pig-powder once a week to all sows when confined to the house, and one to (say) every three pork or growing pigs every Monday in their food, and they, having missed their Sunday teas, are ready for their breakfast, and take the lot without cavilling about the taste of the powders. They act much better on the empty stomach than on ordinary feeding days.

MANAGEMENT OF THE BOAR.

One of the most important points in breeding is the sire. He should be of a pure breed, and a good sort, with a good, strong, masculine look when he meets you, set well on his legs, and a good width both behind and before, with well-sprung ribs, and hams well down his hocks, tail up, and a set of strong, light legs and feet, and with good, springy pasterns. His legs should be outside his body, as though they had been nailed on after, and not made out of the whole piece.

He should have a house and yard away from the other pigs, especially the suckling sows, as I have known lots of promising litters ruined in both number and quality with the boar troubling the sow during suckling.

Most sows come in use about four days after the birth of the offspring, and again at the end of three weeks. The milk is always affected for a day or two, but if the boar can get to the sow or get to the partition she will spend

most of her time grunting to him in place of resting and feeding her family, not to mention knocking them about and trampling on them in her endeavours to get to the boar again.

Some people serve the sow on the fourth day and some at the end of three weeks, and so gain a little time towards getting what I think is a catch crop of pigs. But, for my part, I am satisfied to have two litters per year, and wait till after the pigs are weaned before serving again. I am quite sure it is the best way, and most profitable in the end; the sow always loses her milk when put to the boar again if the service is a success.

In keeping a boar he will be serviceable a long time if properly kept. He does not want to be fat; in fact, he is much better the other way. He is better able to jump, and the sow is not so knocked about with holding him as when he is fat and heavy. He will work freer and get more pigs at each service if kept rather lean, with plenty of exercise and fresh air. By keeping him lean I do not mean starving him, as nothing can do its work properly if not in condition to do it, but just in hard, working condition. Should he get a little below his work a few old beans or peas given once a day will help him on and give a spurt to his lagging energies.

I do not like the practice of turning a boar out to a number of sows and letting him serve them indiscriminately, as he will go on serving one sow for two or three days doing no good, as one good service is as good as twenty, neglecting the other sows and at the same time running himself down for no good result. It takes up a bit of time, but is much the best way, to turn the boar out to each individual sow, and put him back into his pen after each service. I do sometimes serve young gilts twice if I want to make sure of them and lose no time, but for sows newly weaned which are put to the boar on the second or third day of œstrum, one good service is plenty.

I like to keep them in a pen to themselves till the period of heat is over, as they jump and knock the other pigs about when running together. I have thought it sometimes killed the embryo pigs by so doing, and for that reason I usually fasten them up for two or three days after service.

One thing I want to impress on my readers is to keep the boar away from the breeding sows during the time they are suckling their litters. I have known many litters lost, and I do not think it possible to rear good litters of pigs if the sows and boar are kept in the same yard, as he is constantly irritating the sows, and so causes them to lose their milk and knock the young pigs about much more than if kept quite by themselves.—AMICUS, in the *Farmer and Stock Breeder*.

BONEMEAL FOR PIGS.

Some interesting experiments on the effect of bonemeal on pigs have been made by Professor W. A. Henry, the results of which have been published in the *Breeders' Gazette*.

In the experiment, says the Professor, all the pigs received maizemeal, salt, and water. Lot 1 received nothing additional; lot 2 was fed on hardwood ashes from a trough; lot 3 was given a spoonful of bonemeal with each feed. In one of the trials, two pigs consumed 10·5 lb. of bonemeal in 112 days, and two other pigs consumed 33 lb. of hardwood ashes. Both lots ate about 8 lb. of salt. All the pigs were kept in pens and allowed the use of a small yard which was covered with a board floor, so that the pigs could not eat any of the soil. Living, as they did for twelve weeks on corn as their sole feed, these pigs grew very hungry for other substances. They would have eaten considerable soil could they have gotten to it, and as it was, they gnawed the wood of their troughs.

The pigs allowed neither bonemeal nor wood ashes failed to develop any considerable frame and became excessively fat, their bellies and jowls almost dragging on the ground—they were dwarfs. Where ashes or bonemeal were fed the pigs developed much larger frames, and were more normal, though not

entirely satisfactory. They also made better gains for the food given. When it came to testing the breaking strength of the thigh bones, it was found that those of the pigs getting bonemeal were about twice as strong as those of the pigs allowed neither ashes nor meal. The bones of the pigs getting ashes were not quite so strong as those getting bonemeal. The average breaking strength of a single thigh bone was as follows:—When neither was fed, 301 lb.; when ashes were fed, 581 lb.; when bonemeal was fed, 680 lb. In these tests the thigh bones were placed on rounded iron edges, 4 in. apart, and the breaking weight brought down directly above on the middle of the bone. We next burned the thigh bones, and found that those of the pigs getting ashes or bonemeal contained much more ash than those getting neither. It may be said in passing that this experiment was not directly practical, for no sensible man would expect to keep growing pigs on maize meal only, as we did, for a long period. It was an experiment to test whether or not such substances as ashes and bonemeal may prove in any way beneficial to pigs, since these animals usually crave ashes and similar substances even when running at large.

JERSEYS.

In the last issue of the *Journal* (May 1) we published some notes on "The Origin, Improvement, Merits and Local History" of Jersey cattle, by Mr. Alfred Gorrie, of Carina, Brisbane. Some of these were also illustrated—viz., Milk lad 4th, Claribelle, Maderia 5th, and a group of heifers by Milk lad 4th. At the time the pedigree of these animals had not reached us. We therefore have much pleasure in giving the full pedigree of Milk lad 4th as far back as 1884, which will show that we have in Queensland a strain of Jerseys of undoubted purity. As Mr. Gorrie remarked, there are now breeders in Queensland from whom farmers can obtain Jersey bulls of high lineage, and as a result of liberal purchases and importations, both by the Department of Agriculture and by private breeders, Queensland rejoices in some of the most fashionable Jersey blood in the world, as a reference to the Queensland Dairy Herd Book will show.

Milk lad 4th, the property of Mr. Alfred Gorrie, Carina, Brisbane. Bred by Mr. Jas. McCulloch, Barholm, Victoria.

Sire—Lohengrin, by Progress 3rd (imported 1,575, I.H.B., H.C.)

Dam—Milkmaid 14th (imported), by Dog Fox (2,384)

g d Milkmaid 9th (vol. iii., p. 287), by Farmer's Joy (1,075)

g g d Milkmaid 4th, by Pride (660)

g g g d Milky, by Ducal (263)

g g g g d Milkgirl, by Banboy (17)

g g g g g d Mr. Gilbey's Milkmaid, by Jack Weller (463)

g g g g g g d Grasshopper, by Omer Pacha (605)

g g g g g g g d Tramp, by Bradwell (109)

g g g g g g g g d Gipsy (imported in 1855).

The Milkmaid tribe is descended from Mr. Gilbey's noted cow Milkmaid, a Royal prize-winner, which was sold to go to America for 155 guineas at the dispersion of Mr. Gilbey's Herd at Hargrave Park in December, 1874.

Milk lad 4th, by Lohengrin, dam Milkmaid 14th, is a perfect silver grey in colour. He was easily first in the yearling bulls at the Royal Show, Melbourne, in 1896, competing against a very large class, and was admitted to be one of the very best yearling bulls ever exhibited at Melbourne; first as a two-year old in 1897; second as a three year old, 1898; and first and champion at the Royal Show, Queensland, 1899 and 1900. Also winner of the Queensland Government prize of 1900 for champion dairy bull, defeating all breeds. Milk lad's stock are wonderfully successful in the show ring. At the Royal Show,

Melbourne, 1898, the 1st prize yearling heifer and champion female of the show, the 1st and 2nd prize yearling bulls were sired by him. At Sydney, 1899, the 1st prize two-year-old bull and reserve champion was a son of his. At Cranbourne, Victoria, Magnets Lad, by Milkclad 4th out of Magnet 12th, was first and champion, and champion dairy bull of the show, at Melbourne, 1899. The first three-year-old heifer, first and second two-year old heifers, winner of the Jersey Derby, first, third, fourth, and fifth yearling heifers were all got by him. At Sydney, 1900, one of his sons was again reserve champion. At Brisbane the same year his only stock here old enough to show were placed first and second in the largest class of yearlings that ever faced the judges at Bowen Park. At Melbourne, 1900, his stock were almost invincible, winning in nearly every class. The leading Melbourne papers, in their notes on the show, considered Magnet 16th, by Milkclad 4th, winner of the Jersey Derby, 1900, to have the most perfect head ever seen on a Jersey.

Lohengrin was bred by the late John Wagner, of Stoneleigh, Malvern, Victoria, and is a beautiful bull, whole colour, being perfect in shape and colour, by Progress 3rd (imported); dam the imported cow Berceuse, by Cardinal (903). Lohengrin won second as one-year-old, Royal, Melbourne, 1894, and second as two-year-old in 1895, beaten on each occasion by his half-brother, Lady Superior's Progress, who has for three years been successor to his sire, Progress 3rd, as champion bull at the Royal Show. Lohengrin's stock were phenomenally successful at the Royal Show, Melbourne, 1897—the 1st prize yearling heifer and champion female of the yard, the 2nd prize yearling heifer, the 1st prize yearling bull and reserve champion, the 2nd prize yearling bull, and the 1st prize two-year-old bull were all by him. His sire, Progress 3rd (imported), took 1st prize over all Jersey in 1891; 1st and champion, Royal, Melbourne, 1892, 1893, and 1894; 1st and champion, Adelaide, 1894, besides numerous other prizes, and has never been beaten. He was bred by Mr. P. Mourant, Jersey, and is by Rosa's Welcome (930, H. C.) out of Lady Rosa (343, H. C.); dam Dinah, by Progress, &c.

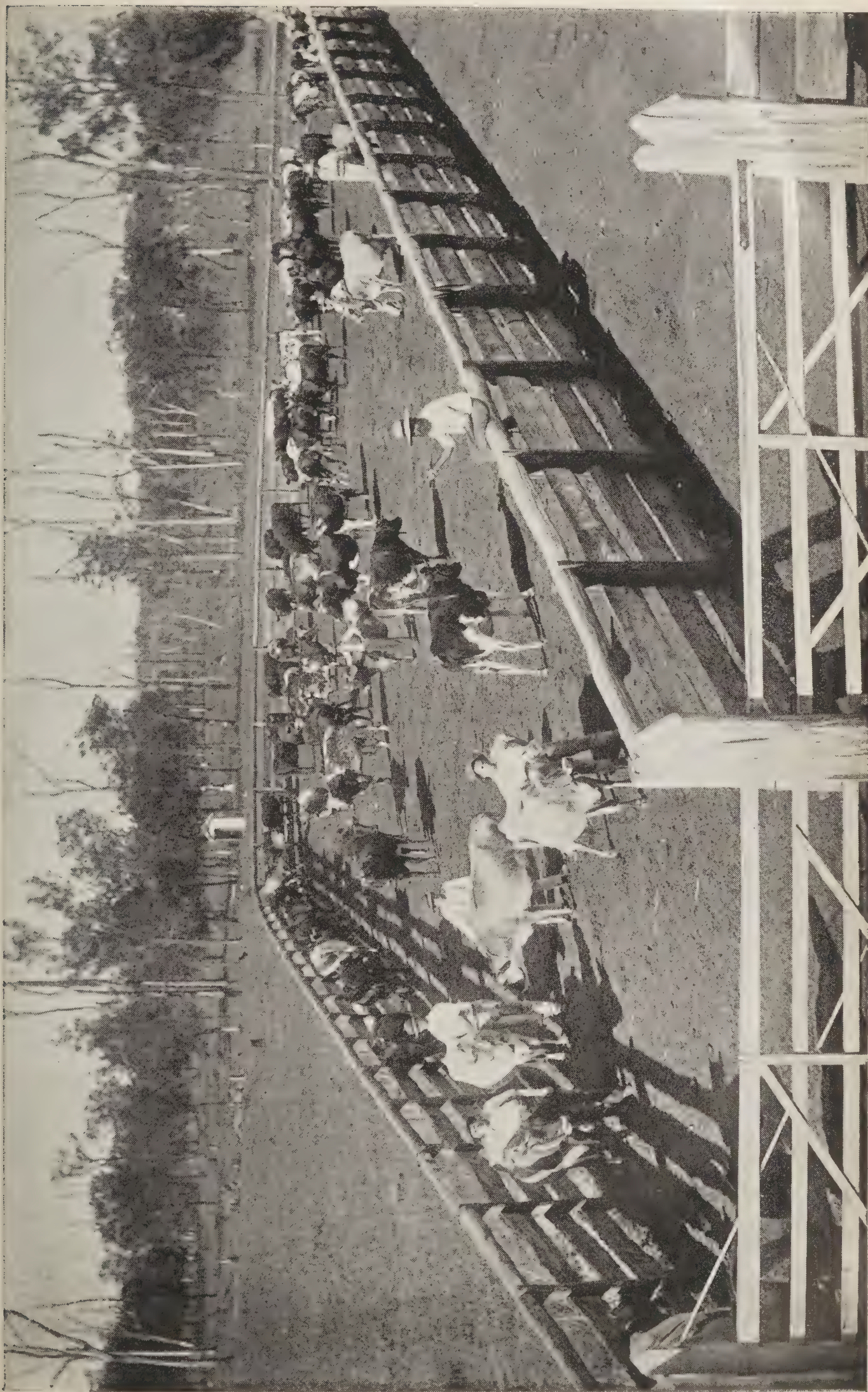
Dog Fox (2,384) whole grey, calved 1st May, 1884, bred by Mr. J. Cardus; sire Baron Lionel (994); dam Vixen (Vol. iii., page 384) by Dairy King (211); granddam Velvetten (imported) by Grey Prince (385); g g dam, Mr. J. Deslandes' Valentine (734, I.H.B., F.S.H.C.)

Dog Fox (2,384) won 1st prize at the Oxfordshire Show at Henley-on-Thames, 1st prize and champion prize at the Royal Counties Show at Portsmouth, 3rd prize at the Royal Agricultural Society of England's Show at Norwich; 1st prize at the Essex Show at Chelmsford, 1st prize at the Royal Counties Show at Reading, and 1st prize at the Royal Agricultural Society of England's Show at Newcastle-on-Tyne, 1887; 1st prize at the Bath and West of England Show, Newport, Mon.; 1st prize at the Wiltshire Show, Devizes, and 1st prize at the Royal Counties Show, Bournemouth, 1888.

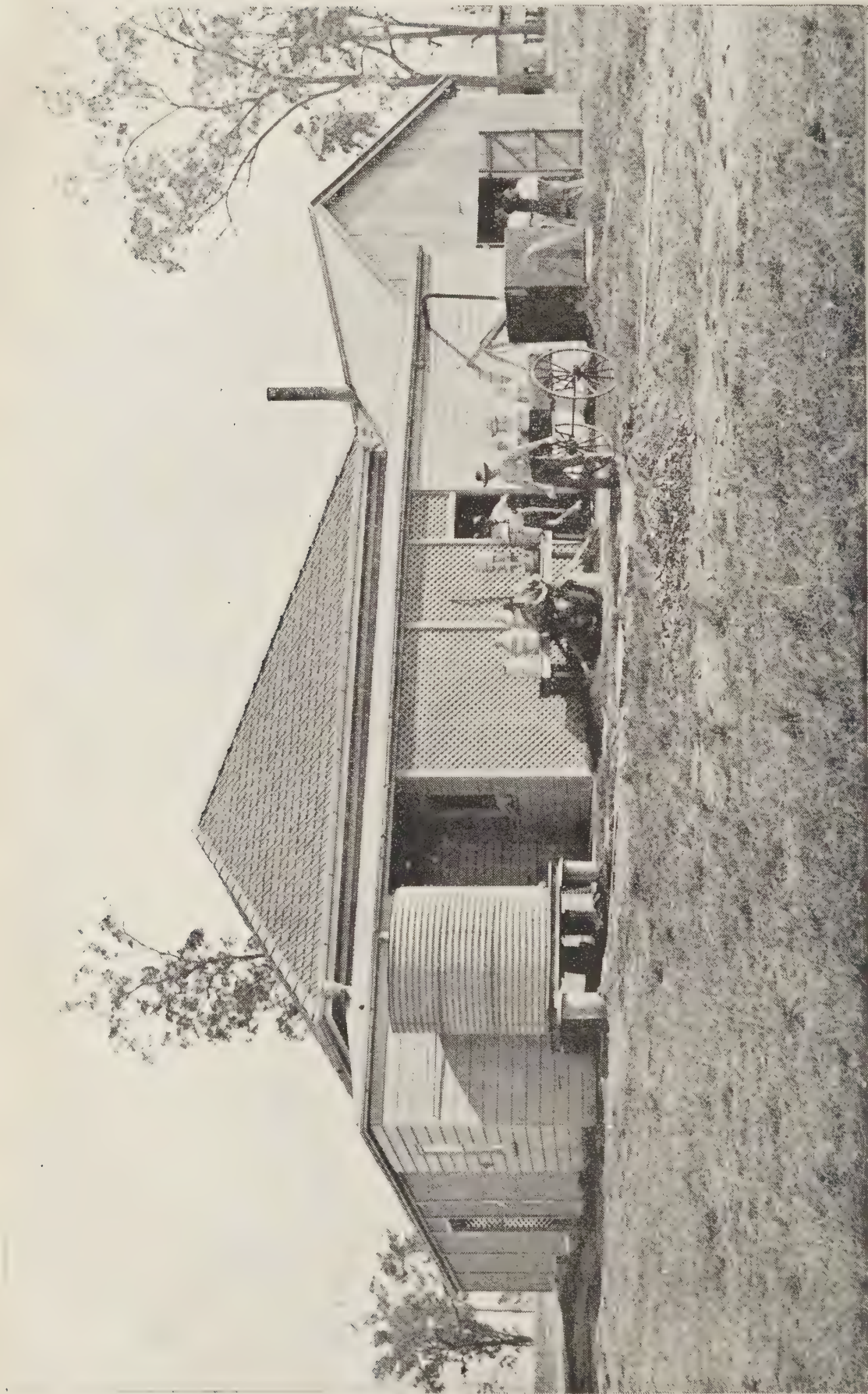
Farmer's Joy (1,075 I.E.J.H.B.) (306, I.H.B.H.C.), out of Victory (1,999), by Farmer's Glory (274, H.C.), won 1st prize as two-year-old bull, Royal Society, England, 1881; 2nd prize, Baintree, 1882; 1st prize, London Dairy Show, 1881; 3rd prize, Reading, 1882, against old bulls.

Farmer's Glory (274, H.C.) took 1st prize, Royal Agricultural Society, Jersey, also first reserve for cup, London, 1879; 2nd prize bulls, any age, Royal Show, England, 1880; 1st prize, United States of America, 1880 and 1881.

Banboy, bred by Mr. Walter Gilbey, is from Mr. Dauncey's beautiful cow, Ban, who was kept idle for nine months in order that she might be put to Mr. Dauncey's great dairy bull Rioter. The English Jersey authority, Mr. John Thornton, referring to the incident in an introductory to the first volume of the "English Herd Book," says: "The produce was the celebrated Banboy, 1st prize bull at the Royal at Wolverhampton, and bred right on both sides for milk and colour, retained the dairy properties, and imparted whole colours to his progeny."



STOCKYARDS, QUEENSLAND AGRICULTURAL COLLEGE.



THE DAIRY, QUEENSLAND AGRICULTURAL COLLEGE,

WHAT THE MANAGER OF A BUTTER FACTORY SHOULD KNOW.

During our frequent visits to the Queensland Agricultural College, near Gatton, we have always been struck by the number of students who go through the dairying course, and this in face of the fact that the "dairy day" is the longest of any course of instruction at the college, the work harder, and sometimes with new milkers and bulls somewhat dangerous, and the care and attention required unremitting. We have seen the dairy students rising before daylight, and wending their way in a damp, raw fog, from their snug quarters to be in readiness for the lowing well-bred herd of Devons, Jerseys, Holsteins, &c., that the herdsman and a couple of students are driving towards the milking sheds. Those sheds have all been made scrupulously clean by the students, the manger filled with barley or silage, the tins and buckets have all been scalded and disinfected, and generally all is in apple-pie order long before the sun looks in to see how matters are progressing. And before even the sun, the principal is there to superintend and assist the instructor with advice and example to the students. Some have got the engine ready at the butter house; the cheese vats, the churns, the butter workers, the cream-separators are all prepared to start the instant the first milkean arrives, and thenceforward the work goes on all day till darkness sets in. Why this eagerness to encounter all this toil?

The secret lies in the fact that at the college the students have a rare opportunity of thoroughly learning the whole business, as well as all the secrets of butter and cheese making under an instructor who is a past-master in the art—for butter and cheese making are arts—of turning out not only such butter and cheese as can and does command the highest price in the market, but of also turning out students who have acquired every species of knowledge required by the manager of a butter factory.

And what is that knowledge? This is what it is, according to Mr. S. Haugahl, who gave an address at the National Convention of Butter Makers at St. Paul, U.S.A., on "Butter Factory Managers of the Future."

The requirements of the future will undoubtedly be that the butter maker shall know his business from beginning to end; know how to set, operate, and even repair the machinery in the factory; know the difference between good and poor milk, and good, fair, and poor butter; and know how to make good butter. This means that he must know how to prepare a good starter, ripen the cream, churn the butter, and know when the cream is in proper condition to churn. To do this he must be familiar with the Babcock test, the composition of milk and its products, and many other things which the butter maker of to-day ought to know, and which the butter maker of the future will be required to know.

What education and training should the butter maker of the future receive in order that he may be fully able to fulfil these requirements?

He should, in the first place, obtain a good business education by taking a course at a business college; then he should serve as an apprentice in a well-equipped and well-managed factory, under a clean and able butter maker, for at least two years.

The first year he ought to learn to wash and how to keep the factory perfectly clean, how to fire the boiler, operate, repair, and care for the machinery. If a man can learn how to do the necessary washing, take care of the machinery in proper shape, and how to keep a factory clean, and also get some insight into the balance of the work in a factory in one year, he is doing well, and promises to be a good man.

The second year he should learn how to test the milk and cream, ripen cream, learn how to prepare starters, grade butter, and develop his sense for tasting and smelling, so he can judge milk, starters, cream, and butter, and know when they are good or poor. This is very important, but thus far has been badly overlooked in the education and training of the butter maker of to-day.

He should be partly instructed about the running of the factory the second year, make some butter, and be responsible for the outcome. If he can learn all this the second year he will no doubt be a most excellent butter maker, but my experience has been that but few learn all this in two years—at least I could not do it—but I meet a number of young men who are looking for positions, or want help in securing positions, as butter makers after having worked less than one year in a factory. This only proves their ignorance and incompetency, as they have not worked long enough in a factory to get even the least idea about the science of cream ripening and art of butter making, or the necessity and importance of qualifying themselves for the important calling of a butter maker.

After having worked in a factory for a sufficient length of time to get a good training and understanding of the business, or long enough to be fairly well qualified as a butter maker, the apprentice should take a course at a dairy school to learn the whys and wherefores pertaining to butter making, milk testing, cream ripening, engineering, dairying, &c. This course is very essential as a finishing touch to the education of the butter maker of the future; as butter making is a science he must be educated as a scientist in that line.

The time when butter making was considered of little importance, a position which any dirty tramp could fill to satisfaction, is already past. To run the cream into the cream vat and let it take care of itself, then splash some water around the factory and utensils, which finished the washing up, did not require much education. This is rapidly changing, however.

The butter maker of the future will be highly educated, and I predict that he will have to pass an examination and take out a license the same as druggists, doctors, lawyers, and men of other professions have to do now before they are allowed to practise for themselves.

This has proven beneficial to the public, and also to men belonging to the fraternity as a weeder out of incompetency, and I can see no good reason why a man should not be compelled to learn the business and stand the chances of an examination before proper authorities before he is allowed to operate a factory. This would do much good as a protection for the factories against unqualified men. It is said it is the business of the owners of factories to look into this matter and find out whether the butter maker is qualified or not.

Men who have had the task of selecting a butter maker from 20 to 100 applicants, with a year or more experience, know how easy it is for almost any youth, who has worked a few months in a factory, to get a recommendation from the factory directors and butter maker as being competent to take charge of a factory. This practice of recommending inexperienced youths as butter makers has done much harm and will have to be stopped, or else some competent board of examiners will be needed in order that a butter maker may go before the board, and if he can pass an examination, obtain a license, and in this way have a recommendation of some value.

It is a fact that, as a general rule, the students at our dairy schools who pass the best examinations prove themselves to be the best men in the field. This is a good evidence that an examination is of great importance in determining the ability of the men.

The butter maker has the welfare of the factory suppliers entrusted to him, and this will be realised as the dairy industry advances, and his work will be appreciated according to its merits more in the future than in the past, and the pay will be according to the service rendered.

The butter maker of the future will not be overcrowded with work, as is the case with a great many butter makers to-day, but will have sufficient time for reading and studying, and in this way he will keep posted, be up-to-date and educated according to the requirements of the time.

RAPID METHOD OF DETERMINING THE PERCENTAGE OF
SALT IN BUTTER.

A new method of testing butter for its percentage of salt has been introduced by Mr. C. L. Fitch, Superintendent of Factories, Fort Atkinson, Wisconsin, U.S.A. This method has for its object the securing of uniform salting of butter, a matter of primary importance, especially when the export of butter is concerned. Mr. Fitch deals with the matter as follows:—

The farm butter maker and the factory manager are alike interested in producing goods of uniform quality. If a certain colour and flavour and saltiness seem the best, then it becomes our aim to produce every day that colour and flavour and the same saltiness. If the task is to produce the desired saltiness of butter in each factory, the problem is doubly important and difficult. If butter contained no water, or if no water would work out of it, the problem would be an easy one. We would simply have to weigh the butter and add the desired amount of salt, working it through, and knowing the salt was all in the finished goods. Our process would be like that of druggists who fill and refill a prescription, putting into it each time the same ingredients in the same proportions, and producing each time the same compound. But salting butter is not like this. Butter contains water in varying amounts, and each batch of butter becomes a problem of how much salt will be worked out of this lot of butter, and therefore the question is: How much salt should be added to this or that churning in order to leave the desired saltiness in the finished goods?

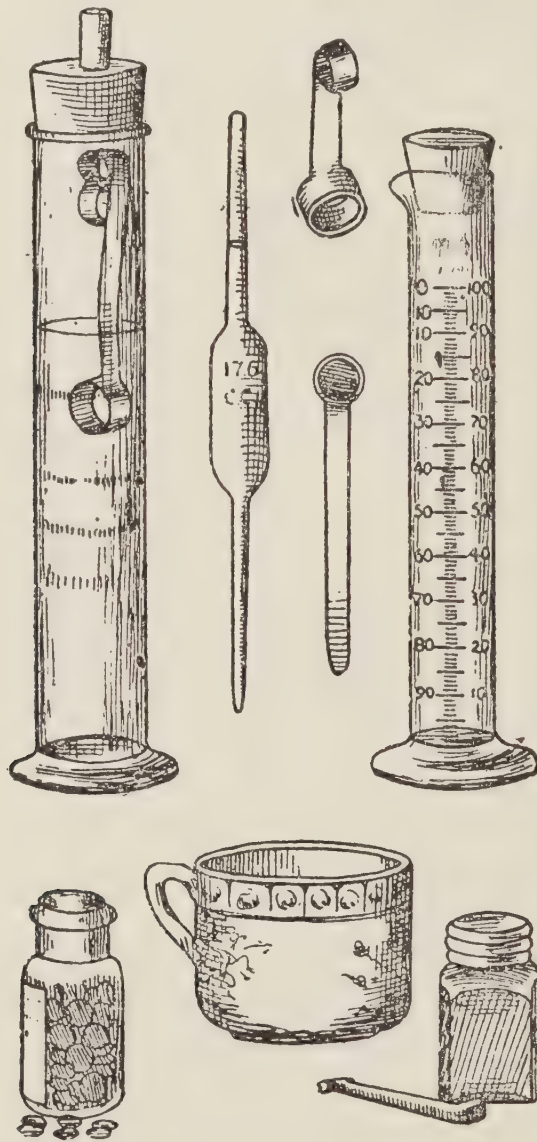
Butter churned according to the old method at 60-65 degrees Fahr. usually came comparatively soft, and was gathered into large masses in the churn. Such butter yields readily to the paddle, as it lies in the bowl, and the amount of water that can be squeezed from it is slight in comparison with butter churned at 50 degrees and salted when in small granules. More recent dairy and factory practice demands for exhaustiveness of churning and the standing up power of its goods this latter method, and therefore correct salting is now more of a problem than it used to be. Again, dairy butter of the first type is usually preferred quite heavily salted, while there is a growing demand for separator butter to be only pleasantly and clearly salt, not sharply or harshly salt in taste. The milder saltiness requires more skill to produce than the other, for, where (say) 5 per cent. of saltiness would not be too much of a variation to either 4 or 7 per cent., it would not be very noticeable, the goods being quite salt in any case; while a similar variation from a 3 per cent. standard of saltiness would make some batches quite salt, and leave almost no perceptible salt in others. This fact, and the fact that the softer butter formerly worked loses in working comparatively little water and salt, made the salting of dairy butter simple in comparison with the problem of how to make modern farm separator and factory butter of moderate and uniform saltiness.

In the days of large, soft lumps of butter, an ounce to the pound meant something as to the saltiness of the finished butter. An ounce to the pound, or one-sixteenth, is $6\frac{1}{4}$ per cent., and such butter was likely to lose but very little salt in working, and contain 5 per cent. of salt, or even nearly 6 per cent., while a churning of firm granules, stopped when as small as millet seed, is quite likely to lose 4 per cent. in working, and so to contain only 2 per cent. of salt when packed. If the millet granules had been gathered to the size of hazel nuts, or had become a little softened before salting, possibly if salted 6 per cent. only 3 per cent. of the salt would have been lost, leaving 3 per cent. saltiness. The art of uniform salting becomes, then, skill and knowledge to judge the per cent. of salt required for a lot of butter to leave the desired saltiness at the end.

In our line of factories there has been great need of a standard of saltiness, because simply to add salt to the butter at a uniform rate does not obtain uniform saltiness. When we left it to the taste of each butter maker to secure such saltiness as pleased his taste, we found that our makers' taste not only differed from each other, but that the individual's taste varied from day to day. We

needed a simple and rapid test to determine the per cent. of salt in our butter, and then to fix a standard; put the apparatus into each factory, and ask for butter containing the desired per cent. of salt.

After studying the laboratory method of determining salt in butter the writer thought that a definite sample of butter could be measured out instead of weighed, and shaken with a definite volume of hot water until the butter should be turned to oil, and the oil globules so finely divided through the water that the salt contained in the butter would pass into solution in the water. Then allowing the water to stand and cool the butter fat would rise, and we could draw off the desired proportion of the water, and by testing this portion determine the per cent. of salt in the butter sample. At this stage the writer went to Madison, where, by the courtesy of the experiment station, and the



advice and help of the assistant chemist, Mr. Alfred Vivian, the amounts of water, butter, &c., for the tests were worked out. Mr. Vivian suggested that the chemicals needed for the test be put into tablet form, and he prepared the formula for the tablets used, and thus greatly simplified and improved the plan.

The illustration shows the apparatus used in the test. The butter is sampled with a trier, and from the trier butter is taken here and there, and the little brass measure is carefully packed full and cut off even with the sides. This gives an accurate weight of butter. The large cylinder is then filled with hot water, to the line running round it, and the little measure is hung inside as shown, and the whole is vigorously shaken, venting occasionally by removing the small rubber stopper. One of the silver nitrate tablets is dissolved for each 50 cubic centimeters of cold water in the graduated cylinder, and after

the large cylinder and its contents has cooled the 17.6 c.c. Babcock pipette (such as is found in every factory) is run through the fat, which has risen to the top, and 17.6 c.c. of the clear salt solution is drawn off and put in the white cup. The tiny measure of the powdered indicator is then put into the cup and dissolved, and the tablet solution added until the brick-red colour formed no longer disappears. The number of c.c. of tablet solution used indicates the number of tenths per cent. of salt contained in the butter. Thus 25 cubic centimeters indicate 25 per cent. salt, and 30 c.c. shows that the butter carried 30 per cent. of salt.

We have at this date used the test in each of our six factories for a year, requiring frequent tests to keep our makers' tastes in trim, that each factory may turn out butter of the same saltiness. It is of great value to us. We find that we are able to bring the variations within one quarter of 1 per cent. from the standard desired, a difference just perceptible to a trained taste. In rare cases when too much salt has been used, the boys wash out a little by working with water. It is the writer's opinion that for uniform salting the combined churn is preferable to a table worker in that it enables us to use water for this purpose. I have taken an electric light, gotten into our large combined churns, and have looked for water in the churn, and have not found any where reasonable care was used. It is the water adhering to the butter granules and incorporated into the grains of butter that effects salting, whether in a combined churn or upon a table worker. Its use throws much light upon butter making problems.

The writer has made extended experiments upon butter salting as influenced by different conditions of temperature and churning. The experiments were performed during the present winter, and upon butter of good, natural firmness.

These results can be made to illustrate many principles of butter making. For instance, they show, what our experience in factory practice has shown, that butter overchurned or churned to masses, requires from 3 to 4 per cent. less salt for the same saltiness than otherwise similar butter salted in fine grains. They show that hard butter requires much more salt than soft butter, and that the larger the grains of the butter the less salt is required.

They show also that a partial working, before salting, makes a large saving in the salt needed for the desired saltiness, and that uniform saltiness is more easily obtained by so working, where over-working of butter is not a bar to the method. Of the saltings with the different salts, they indicate, so far as the few experiments go, that there is little difference between the salts used in their quality of imparting saltiness to the butter. Incidentally these experiments show that a second working costs greatly in weight and saltiness, especially of butter that was worked the first time when quite soft. The second working after standing cold, makes the salt and water contents of butter, which was soft when first worked, very nearly like those of the firmer and colder goods similarly treated.

It is the writer's experience that it is best to secure round, firm grains of butter, say as large as peas, and to salt in the granular form. If the most weight is wanted churn cold granules, and then use wash water at 60 degrees or higher, and let it stand on the butter for some time; salt well, and work lightly. It must be remembered, however, that such butter, though it may taste good and appear well, will leak badly, will keep poorly out of cold storage, will lose heavily if reworked, and is not really honest butter.

If the very dryest butter possible were wanted, I would churn cold, work before salting, work in the salt well, and then re-work after holding some hours at about 56 degrees Fahr.

By the constant use of the salt test our butter makers are able to develop their taste, and increase their knowledge of salting problems, until they are able to meet varying conditions, and produce at all times butter very close to the desired standard of saltiness.

We find that May and June especially, and summer butter in general, is as salt from 5 to 6 per cent. of salt, as is fine granular butter in winter from the addition of 8 to 10 per cent. of salt.

We believe that butter dealers find in their goods—where the ounce to the pound method is the makers' unvarying rule—that batches differ greatly, and that summer butter is frequently very salt, and winter butter frequently very mild. We anticipate the general usefulness of this new test, and its wide adoption by factories, by butter dealers as a standard for their shippers, and by butter makers everywhere, who desire to produce the best and most uniform goods. Possibly butter makers' associations will establish a standard of saltiness for general trade and for butter shows, and leave this point no longer a question of judgment but of accurate test.

EXPORT OF BUTTER FROM VICTORIA.

During the year 1900 Victoria exported 37,793,161 lb. of butter, of which quantity 26,185,679 lb. were sent to the markets of the United Kingdom. During the first three months of 1901, 8,309,399 lb. were exported from that State.

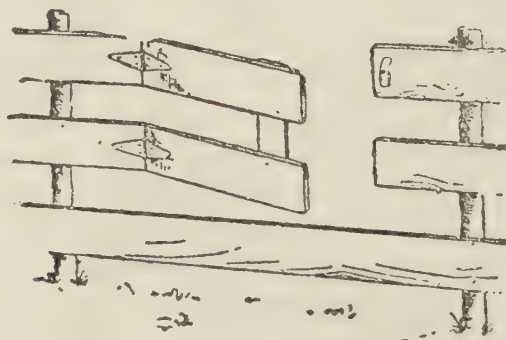
LEECHES IN A COW'S UDDER.

Mr. R. J. Cribb, bee and poultry expert, Milton, writes:—

Referring to "Leeches in a Cow's Udder," appearing in last month's number of the *Queensland Agricultural Journal*, it may be of interest to know that last April I presented the Agricultural College, at Gatton, with two leeches (preserved in spirits), which were extracted from one teat of my cow, about four years ago. The cow has been attacked by leeches similarly on several occasions, but never had more than three leeches in one teat at a time; and beyond the loss of the milk from the affected part for three consecutive milkings she was none the worse.

OPENING IN A FENCE.

Where a fence is crossed by rarely, a half-gate like that shown in the cut can be made in a few moments. Saw off two boards and screw over the cuts two strap hinges. Nail on the up-and-down piece and saw off the other ends.



A button completes the gate. Where a whole gate is to be made in a fence, it can easily be made in this way after the fence is built. Nail on the up-and-down pieces. Saw off the boards at one side and screw on hinges. Then saw off the other side. The above illustration we take from the *Farmer and Grazier*.

Poultry.

USEFUL FIRST CROSSES.

DIFFERENT FROM MONGRELS.

A first cross is distinguished from a mongrel or "barndoor" bird by being the result of the mating together of two pure breeds, whereas the mongrel is the outcome of continued and indiscriminate crossing; and it will be evident that a first cross, being a known quantity, should produce better results than the progeny of promiscuous breeding, for in the former case we can breed with certain aims in view, such as improved stamina, increased laying powers, or better table qualities, and we may reasonably expect to attain them, whereas with the mating together of crossbred birds we ought not to look for anything beyond mediocrity.

It may be that some of our readers, possessing some pure-bred hens or pullets, are still undecided as to what cross it would be advisable to make to attain some desired good, and the following few suggestions may be of assistance to them in making out a list of desirable first crosses. I have purposely omitted the naming of two sitting varieties in conjunction, as my experience goes to prove that the advantages to be derived from such mating are very slight, and sitters may be the result.

In crossing, the hens or pullets must always be of the larger breed, as if the male be the larger bird infertility may result.

In giving the following selections I divide them into two classes, the first for general purposes (layers and table birds combined) and the second for table birds only.

FOR GENERAL PURPOSES.

Minorca-Langshan. This cross will produce fairly large-sized birds of handsome and sprightly appearance, with plenty of white juicy meat, splendid all-year-round layers of large tinted eggs, of hardy constitution, and moderate sitters. These will have slate-coloured legs and some slight leg feathers.

White Minorca-Plymouth Rock will produce handsome birds, good for the table, capital layers of good-sized tinted eggs, hardy constitution, rather inclined to broodiness; some will have yellow legs and skins, some white.

Houdan-Buff Orpington will make a very satisfactory cross for layers and table qualities, moderate sitters, quick growers, and fairly hardy; their appearance will be rather motley until dressed for table, when they will be found plump, small-boned specimens, with white legs.

Redcap-Golden Wyandotte, a very handsome bird, will be produced by this cross, and for egg production it will probably excel those previously named; at the same time it will make a very compact table bird of fair size and with well-flavoured meat, and a quick grower; eggs tinted; sitting propensities slight; skin and legs yellow in some instances, white in others.

FOR TABLE POULTRY ONLY.

Indian Game-Dorking, the favourite cross for the table; the chickens mature quickly into plump, meaty birds, flesh firm and of the finest flavour; skin either yellow or white; the chickens are fairly hardy.

Dorking-Langshan. This cross will produce the largest table bird, with white succulent flesh of the finest quality; the Langshan blood will correct the delicacy of the Dorking chick. The original Black Langshan is here referred to, and the White Dorking is recommended more particularly for this cross when procurable. Skin white; some birds will be slightly feather-legged.

Spangled English Game-Buff Orpington is an excellent table cross; the chickens are very hardy, and will grow quickly into plump specimens; flesh white and of splendid quality; legs white and clean.

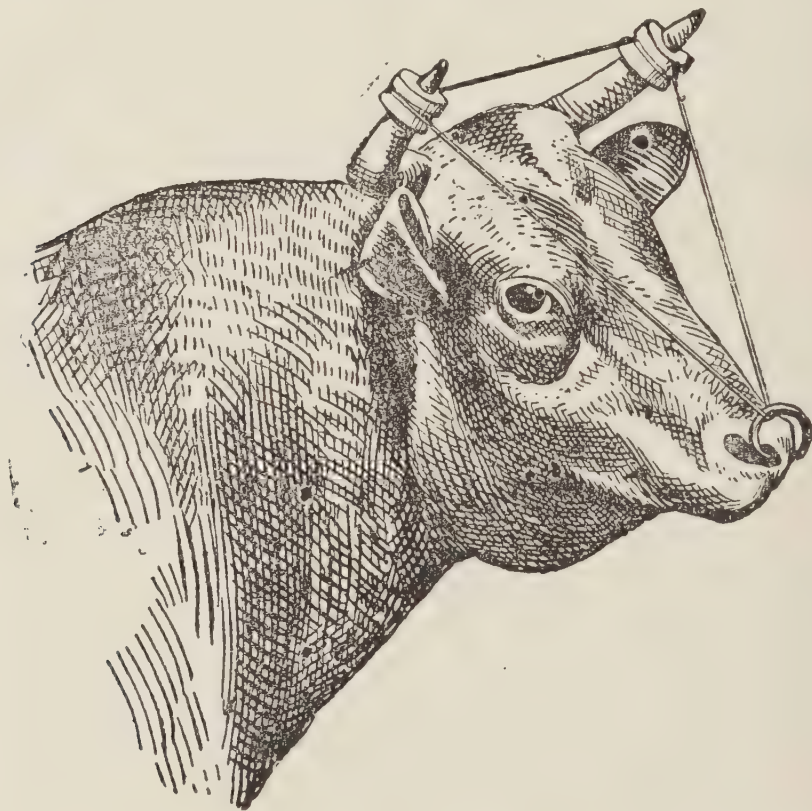
Houdan-Langshan. This cross produces splendid fowls for table; flesh abundant and of excellent quality; the chickens are hardy, and grow rapidly; some birds will be slightly feather-legged; this is also an excellent laying cross.

There are many other crosses suitable for the above purposes, but I have confined myself to naming some of the very best.

The only drawback to keeping first crosses is that it is not advisable to breed from them, as a pure-bred cockerel should be used, and this upsets the balance of the cross every second year. The original pen of birds, if it contain pullets to start with, may be safely used for two or perhaps three seasons at a stretch, after which it must be replaced.—A. REDCOMB, in the *Farmer and Stock Breeder*.

TO TAME VICIOUS BULLS.

From time to time reports appear in the Press of injury to human life caused by bulls rushing. The Jersey bulls seem particularly liable to develop dangerous temper, though more often than not this is due to mismanagement. Some of the Jersey bulls owned by the Department have done injury to their keepers, who, in some instances, admit their own carelessness was largely responsible. In order to prevent the bulls from injuring people, various devices have been adopted, most of them consisting of "head gear" of some description, as this does not interfere with their movements.



The device illustrated here is highly recommended by several breeders. A block of wood is screwed on to each horn, and a wire stretched from block to block, and also to the nose ring, as shown. So long as there is no pressure on the wires between the ring and the horns the nose ring is simply held upwards without any discomfort to the animal. Should the bull rush any other animal, or attempt to get through any fence, the pressure pulls the nose ring upwards, causing considerable pain. It requires very few experiences to teach the animal that any misbehaviour on his part is attended by suffering to himself. One prominent breeder says even the fiercest of bulls is quickly tamed by this device.

In place of the blocks on the horns the latter are sometimes bored through near the point and the wires secured. The blocks may also be put on in different ways, the object being to bring the wires from the horns to the nose away from the head and face.—*South Australian Journal of Agriculture*.

The Orchard.

PROGRESS IN THE FRUIT INDUSTRY OF QUEENSLAND

Amongst the various States of the Commonwealth of Australia the first place must be assigned to Queensland in the application of the processes of fumigation to the destruction of insect pests of fruit trees and of other plants. Queensland has not perhaps done so much in this direction as Cape Colony, but has done far more than any other Australian colony. The work, indeed, has quite left the experimental stage, and for nearly two years the Queensland Department of Agriculture has had a complete cyaniding outfit at work in the citrus orchards in various parts of the colony, fully 20,000 trees having been treated by the departmental and private outfits. In addition to the fumigation of trees in the orchard many thousands of nursery stock and thousands of cans of fruit have been put through the cyaniding chambers, besides which several of the largest nurserymen cyanide every plant before it leaves the nursery. As to the efficacy of this mode of treatment Mr. A. H. Benson, who has charge of the operations, says that there can be no question, and he speaks with a large amount of practical experience. Having tested many kinds of sprays and spray-pumps during the last thirteen years, both in California and various parts of Australia, he has yet to find a remedy that is superior to cyaniding for the destruction of scale insects. The results of this method of treatment have been very marked, trees that were practically useless and even dying from the attacks of scale insects of various kinds having thereby recovered, and subsequently made extra vigorous growth and produced fruit of superior quality.

Few trees are subject to the attacks of so many kinds of insect pests as citrus trees—the orange, lemon, lime, and their allies. They are injured by insects that live by sucking the leaves, bark, or skin of the fruit; by insects that destroy the leaves, skin of the fruit, and bark of smaller twigs by actually devouring the same; by insects boring into and destroying the fruit; and by insects boring into and destroying the branches, trunks, and roots of the trees. The first-named group—the insects that live by suction—include the scale insects, aphides, and sucking bugs, and it is in the case of these that the gas treatment, or fumigation, is found specially effective. In the extensive orange orchards of California it has practically taken the place of spraying for the destruction of the red scale, the purple or mussel scale, and all other armoured scales. In Cape Colony it is now largely used for destroying red scale, and is found to be the cheapest and most effective means for suppressing the attacks of this insect. Extensive experiments have been made by the Queensland Department of Agriculture to ascertain the efficacy of hydrocyanic acid gas as an agent for destroying red scale, circular black scale, mussel scale, white scale, glover scale, greedy scale, pink wax scale, and San José scale, and in every case success has been attained. In order to apply the gas it is necessary to envelop the tree to be treated with a gas-tight covering, in the form of either bell-tents or octagonal sheets. The former can be made large enough to cover trees up to 10 feet in diameter and 12 feet high, but for trees exceeding this size sheets are preferable, as bell tents would be too heavy and unworkable. The tents and sheets are made of the best Canadian duck, tanned for the purpose of preservation with a strong extract of iron-bark and wattle-bark. For charging the tent with gas it is necessary to calculate its cubic contents, and to provide 1 oz. of cyanide of potassium, 1 fluid ounce of sulphuric acid, and 3 fluid ounces of water to every 300 cubic feet of space. The water is put in an earthenware dish, the acid is next poured in very slowly, and the dish is placed under the tent, as far from the canvas as possible. The cyanide is now added to the solution, and the operator promptly retires from the tent, which he renders airtight by every means available. The reaction of the sulphuric acid and the cyanide of potassium results in the generation of hydrocyanic acid (that is, prussic acid) gas, which is a poison that kills all scale and other insects subjected to it. The trees remain covered for forty-five minutes. On account of the deadly nature of the insecticide many precautions have necessarily to be

observed by the operator. Mr. Benson, who took the diploma of the Royal Agricultural College, Cirencester, twenty-two years ago, has constructed a very useful table of measurements of trees and quantities of material for the use of "cyaniders."

Not much progress has yet been made in England with this new insecticidal process, though it is unquestionable that a considerable degree of success has attended its application in warmer countries. Scale blight is not so troublesome here as in hotter regions, but our fruitgrowers are familiar enough with such a pest as, for example, the mussel scale, *Mytilaspis pomorum*. Of the closely-allied aphid blight they have a much larger experience, and it seems not unlikely that for the suppression of this trouble, the practice of fumigation with hydrocyanic acid gas will be more largely resorted to in the future in this country.—*Daily News*, London.

STRAWBERRY PICKING IN THE UNITED STATES.

There are two ways of picking strawberries—a right and a wrong way. We have seen a strawberry-grower lay hold of the berry with his finger and thumb and press it tightly while he dragged it off its stem. Others take the trouble to cut off each berry with a pair of scissors, but in both cases they gathered a handful before putting the berries in the basket. *The Southern Farm Magazine* (U.S.) gives the following directions for the proper handling of this delicate fruit, but we do not agree with the writer when he advocates no grading. Filling up the pottles with small fruit cannot but have the effect of reducing the price in the market.

The berry field has been well cultivated and kept clean the past season, and now the plants have commenced to grow. Soon the blossoms begin to come out, and in a few days the rows are white with them. Next the berries commence to grow, and here and there you can see one taking on a little colour. In a few days look over the field and you see hiding under the leaves the bright red berries.

The time has come to get ready for gathering the crop, as the berries never wait for you. Fill up the packing-shed with crate material and make up crates at odd times or wet days, so as to have a good supply of made-up crates when the rush comes, for come it will.

We use picking stands that hold six standard quarts. When we start the picking in the field we give each picker a row and they pick it clean from end to end; then they take another, and so on till the field has been picked over. In this way you can tell who does good and who does bad work. We have men in the field who stay with the pickers and look after them to keep them from getting in one another's row and to see that they pick their rows clean; also to see that the berries are picked as we wish them.

We never allow our pickers to hold berries in their hands till they have picked a handful and then put them into the cups; we require them to pick each berry separately and place it at once in the cup. We also require them to hold the berries by the stem and avoid touching them. Thus the berries are brought to the shed in perfect condition. If you allow the pickers to use any other method they skin and bruise more or less berries, and when they are opened in market they have a mussy appearance. If pickers eat berries we dock them so many quarts the first time and more the next; this punishment has always proved a sure cure. If they pick berries and hold them in their hands we dock them so many quarts the first time and more the second. If they keep eating we give their place to some one else.

In shipping we use the best 24-quart crates we can secure. We do not sort or grade the berries; each picker throws out or leaves out the bad ones. The few small berries that go in do no damage, provided they are sound and good. Fill your cup full; fill your crates full; send your wagon to the dépôt full; and if you send high-grade berries to good markets they will fill your pockets full of good round American dollars worth 10 cents each in Cuba, Porto Rico, Manila or any other foreign seaport.

Apiculture.

BEES AND HONEY.

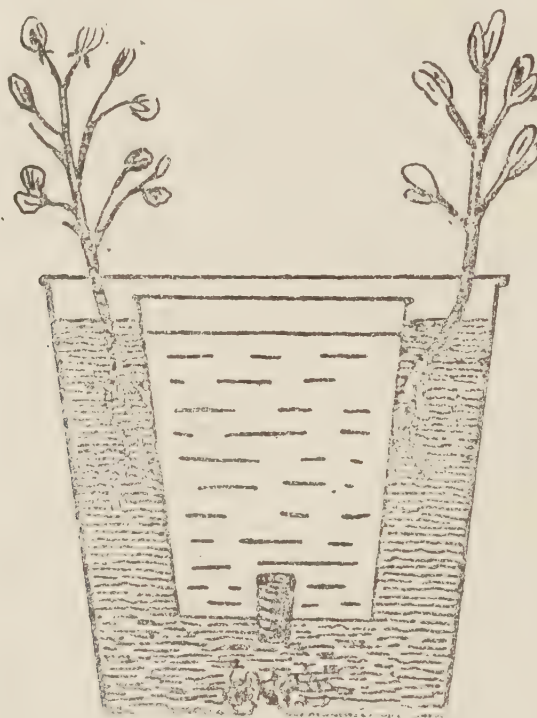
Australian honey has always had an uphill fight to gain a footing in British markets. Latest advices quote from £20 to £25 the nominal price for our product, whilst Jamaica honey sells readily at £28, and Californian at £42 10s. per ton. The reasons for such a wide discrepancy in prices are not far to seek. We admit that in the Commonwealth, and in our own State in particular, there are apiculturists who possess the most intimate scientific knowledge of their business. The bees are admirably managed, the latest appliances and the most modern inventions are to be found in all our best apiaries, and the honey, when extracted, cannot be surpassed for appearance. Whence then arises the want of appreciation of Australian honey in the United Kingdom? Two causes may be cited. One is, the idea that Australian honey is redolent of eucalyptus is apparently ineradicably fixed in the mind of the British householder, and the other, that hitherto a great deal of carelessness has been shown by some beekeepers in putting up their honey. It is well-known that style and get-up of any article of consumption placed on the market have a great deal to do with gaining the favour of purchasers. If the best British, French, or Californian honey were put up in the manner obtaining a few years ago in this State, it would probably be as unsaleable as our own. To-day, beekeepers all over Australia recognise this fact, and their honey is put up in as attractive a form as can be seen in any part of the world, thus completely disposing of this objection. With regard to the eucalyptus flavour, the prejudice so rooted in the British mind is a far more formidable obstacle to a lively trade. There is no gainsaying that when the eucalypti are in flower, the bees swarm upon them, for they find, as do countless parrots and lories, that the flowers contain an enormous amount of honey easily reached. Now, however healthy a eucalyptus flavour may be, the palate requires to be educated to it. We Australians are so used to it that we do not perceive the taste, and as a matter of fact, deny that it exists. That is a matter of habit. But it is fully recognised by Victorians, and, indeed, by most beekeepers in other States, and vigorous steps are being taken to lure the bees from the eucalypti by sowing clover, lavender and other plants which bees love in field and garden. With the extension of this work, and by proper attention to grading and packing, the time will come when Australian honey will stand in as high estimation in the home markets as does the Californian product.

On the subject of the export of honey, the *Australian Field* says:—The majority of shipments of New South Wales honey sent by apiarists have not yielded satisfactory returns, so the necessity for an export market is at present more pressing than ever. A determined effort is being made to test the London market by the Farmers' Co-operative Company, in the shape of about 400 cases of prime samples, the bulk of which is from the Richmond River districts. The consignment has been put up in cases, each containing two tins of about 60 lb. weight, the tins being of the usual make. The honey was forwarded by the steamer "Ortona," which left Sydney on the 24th ult. At present the local market is glutted with honey of all grades, and large quantities could readily be obtained from the northern rivers and elsewhere if there were a prospect of obtaining fair prices. One of the difficulties which have confronted exporters in the past has been the inability to prevent leakage through the tins, and consequently heavy losses.

Horticulture

SIMPLE METHOD OF STRIKING CUTTINGS.

The accompanying illustration of a simple method of striking cuttings, which we take from *Farm and Home*, will commend itself to all horticulturists. We have tried a plan somewhat similar and find it of great advantage. The journal in question, replying to a correspondent, says of the method:—It has been recommended to us by an experienced gardener. It is made and used thus: Take two flower pots, one large and one a few sizes smaller. Place in the larger one a layer of pebbles, broken bricks, &c., and a few inches of black earth. With a good cork plug the drain hole of the smaller pot and put it inside the larger one, centering it upon the layer of mould. Fill it with water,



and fill the circular space between the pots with more mould, as shown in the illustration. Insert the cuttings all round, and without further attention they will strike roots and thrive in a way calculated to make the floriculturist's heart glad within him. The roots and fibres make straight for the sides of the water reservoir, through which all the moisture they require is absorbed. If the packing of the earth in the larger pot has been properly done, the smaller pot can be lifted out now and then, and the process of root formation readily observed. Seeds can also be germinated readily in a simple contrivance of this kind. Choose fine sandy loam for striking the cuttings. If the weather outdoors is very cold, stand the pot in the kitchen, particularly at nights.

DESTROYING WEEVILS IN MAIZE.

One pound of bisulphate of carbon will destroy all the insect life in 100 bushels of grain in a bin or barrel if a close cover is put on the barrels after application. Bisulphate of carbon is a poisonous gas, heavier than the atmosphere, and if some of it is placed in a little tin, or a saucer (do not use the tin or saucer for any other purpose afterwards without washing well with kerosene, and afterwards soap and water) it will find its way downwards through all the grain. You cannot do this, however, with corn intended for seed, but quite safely with corn intended for feed.

Viticulture.

THE WINE INDUSTRY IN SOUTH AUSTRALIA.

A RECORD VINTAGE.

If there was one thing more than another that astonished the members of the New Zealand Royal Commission during their recent trips around Adelaide, it was the extent of the winegrowing industry. They visited the State at a favourable time, as the present vintage is a record one, and good judges think they are safe in estimating the "make" at 2,250,000 gallons. The previous best vintage was in 1897, when 1,898,195 gallons were made. Then several years of drought knocked the figures back considerably, and last year the return was only 1,558,285 gallons. Most of the cellars throughout the State report large increases. At Seppeltsfield, Mr. Benno Seppelt expects to make between 390,000 gallons and 400,000 gallons, and when the vintage is over there will be stored at the cellars at Seppeltsfield nearly 1,000,000 gallons of wine. Owing to the bad years stocks had diminished and a prolific yield was greatly needed. The Adelaide Wine Company hope to make 350,000 gallons at the Chateau Tanunda. The Angaston district has been equally busy, and Messrs. S. Smith and Sons, S. Salter and Sons, and Gawler Park report heavy crops. They have made 140,000 gallons up to the present at Yalumba, and grapes are still coming in. Messrs. Tolley, Scott, and Tolley, at Angas Park, and D. and J. Fowler and Co., at the Moppa, have had a particularly active season. In the Clare district the crop was phenomenal. The unexpectedly heavy supply taxed to the utmost the energies of the Stanley Wine Company. Last year Mr. A. Basedow made 35,000 gallons, but this year the "make" will run into 80,000 gallons. To avoid the possibility of a block in the future, and in anticipation of an increased yield next year, the Stanley Wine Company is looking forward to further enlarging the cellarage and the capacity for manufacturing. Mr. Seppelt also intends to make his winery as large again to cope with next year's crop. At Sevenhills College the brothers have made 6,000 gallons of wine, against 3,500 last year. From the Watervale and Auburn districts equally satisfactory reports are to hand. Spring Vale has had a good time, while at "St. Andrew's" Messrs. Christison and Lyall have made 27,000 gallons against only 5,000 gallons last year. Mr. J. B. Tothill has produced about 18,000 gallons.

Mr. T. Hardy says his firm will make about as much, if not more than, in 1897, when the return was 360,000 gallons. About 200,000 gallons of this will be credited to Maclaren Vale. At Tintara the yield has been about 4,000 gallons short of what it was in 1897—50,000 gallons. At Woodside there has been a great advance on the figures of last year. Mr. R. S. Wigley, Mr. A. Johnson, and the other growers in the Maclaren Vale district are particularly well pleased with the great crops they have gathered. Mr. B. Basedow has been kept busy at Vale Royal and Horndale, and at both places there is a record yield. Of the fifteen awards obtained by South Australia at the recent Sydney Wine Show these two cellars secured nine. Messrs. R. M. Owen and Co. have made 16,000 gallons. Mr. Ross Reid sends highly satisfactory reports from Reynella. Mr. M. Mazure has turned out between 60,000 gallons and 70,000 at Auldana. These figures give a good idea of the wonderfully fine vintage, and everything looks rosy for the wine-growing industry in South Australia.

It will not be out of place here to quote the remarks of Mr. A. Pownall, the London wine merchant, who was recently in Adelaide, as to the future of the industry. He says:—"As regards the future in South Australia in particular, I think that every encouragement should be given to planting. The phylloxera in Victoria has practically stopped all planting there, so that the area under vines is decreasing yearly, and when the intercolonial duties come off the South Australian growers should find a good market in the other States, both in sweet wines and in light wines, especially the latter, in which they will have very little competition to fear from Victoria. With this fresh demand, in addition to the steadily increasing sales in England, and an apparently good call for your wines in South Australia itself, I have no hesitation in saying that there is a distinctly bright outlook for the wine-growers in South Australia. A large buyer said to me at home, 'The trouble in the future will not be to sell Australian wine in England, but to buy it in Australia.'"—*Adelaide Observer*.

TRAPPING WIREWORMS BY HUNDREDS.

The early tomatoes in two hothouses had just been planted out, in the soil of the houses—not in pots—and a few had fallen from attacks of wireworms. No time was lost in encountering the enemy. A few carrots and beets of extra size, and therefore not desired in the kitchen, were cut into wedge-shaped pieces, and one piece was stuck into the ground about 3 inches from each tomato plant, under the impression that the wireworms would prefer carrot or beet to tomato. This impression proved correct, for, when the traps were taken up, three days after the setting of them, over 700 wireworms were caught, either in or close to the bits of carrot or beet, as many as fourteen being found in or near one piece. It was satisfactory to find that beet served as well as carrot, because the assumption is that the common mangel would do as well as either, and wireworm traps are thus cheap enough. The 700 wireworms were caught with 1,157 traps, the first time of taking them up, and as the traps were immediately set again, another haul or two may be expected. It is desirable to take up the traps with the point of a trowel, because many of the pests are to be found in the soil around a carrot or beet trap, though more have eaten their way into the vegetable. The work of cutting up the roots and sticking the pieces in the soil was that of only about three hours for one man.—*Agricultural Gazette*, London.

TO UTILISE CUCUMBERS.

In a month or two cucumbers will begin to be in evidence. As the season progresses the price of this vegetable will gradually be reduced until the non-paying point is reached. Why not adopt the Russian and German plan and pickle them? The process is very simple. All that is required is a tank full of the strongest brine. Into this the cucumbers are plunged and left there for a month or six weeks. Then they are taken out, sorted and graded, packed in jars or tubs, and they find a ready market at a price which pays the grower even better than the fresh article. We allow quantities of vegetables and fruits to go to waste in this State which in other countries are utilised in a variety of ways. It is in little things that waste occurs on the farm. Much that is thrown away could be utilised in such a manner that the household expenses would be sensibly benefited if only the housewife would learn a lesson from older countries.

Tropical Industries.

COFFEE CULTURE IN QUEENSLAND.

No. 9.

By HOWARD NEWPORT,
Instructor in Coffee Culture.

THE TREATMENT OF YOUNG PLANTS IN THE FIELD.

The young plants having been planted out in the field, a few notes about their treatment there, and the enemies or diseases they may meet with, will be of use to the grower.

Not much actual work is required in connection with the plants themselves, still they need an occasional looking to. The principal work that lies before the coffee-grower, from the time of planting out, is the weeding of the clearing, and this is not only the heaviest but the most disagreeable work. Weeding itself is a big subject, and will be dealt with separately, but I wish to put in here a word of warning against allowing weeds to grow up among young coffee plants just put out. If the planting has been done carefully, and the clearing been at all clean at that time, the young plant will have "struck"—*e.g.*, have sent out rootlets into the new soil round it before the weeds can do much harm to it. But after this it has to acclimatise itself and adapt itself to conditions very different to those of the nursery bed from which it came. At this stage a comparatively small growth of weeds will not only seriously handicap the plant, but possibly choke it, both above and below ground, by covering it and shutting out light and air or matting its roots.

It is hopeless to expect a young clearing to come into bearing in a minimum of time, unless kept scrupulously clean from the commencement.

When very young a plant may be easily bent or broken by sticks, twigs, weeds, or rubbish falling, being blown, or carelessly turned over on to them by weeders. This should be looked to, and every chance given the young plant. Occasionally suckers will appear on the stems, especially after a check at the time of planting, and sometimes double heads grow, or have not been nipped off when planted. These should be carefully nipped off as soon as noticed. In the case of double heads, the weaker or smaller is of course taken off.

If the pits have been narrow ones, as described in article No. 8, *Queensland Agricultural Journal*, May, 1901, p. 372, the ground round the plants should be dug or forked up for a foot or so at least, and stones removed, care being taken not to hurt or turn out the plant itself when the soil is hard and comes away in clods.

At first no mulching is required, but just before the end of the rains, or at any rate before the regular dry and hot weather sets in, weeds, &c., may be heaped round the plant for a foot or so.

This serves to conserve the moisture for the use of the plant during the hot months and prevents the caking of the ground. In mulching the ground should be first loosened, then the weeds, &c., laid lightly round, well covering the top of the pit. Sticks or rubbish likely to encourage grubs should be avoided, and grass, especially couch, is best avoided, for even if not growing readily itself, it seeds so freely. Seeding weeds of any kind should not be used in a mulch, and the mulching never made deep at any time, but light and flat, and as broad, *e.g.*, covering as much ground round the plant as the grower has material or time to spend on the work.

Should the clearing be troubled with grubs, of which I shall speak later on, mulching with weeds or green stuff had better be avoided in favour of a mulching of loose earth about 2 inches deep applied in the same way. Mulching with weeds should not be done during the heavy rains, and if done with earth will have to be done again later on, as the earth mulch soon cakes and

ceases to be of any benefit in rain. *See* remarks *re* "Mulching," *Queensland Agricultural Journal*, March, 1900, p. 214.

Within two or three weeks of planting out the field should be very carefully gone over, and any plants that are still drooping, or have faded or died, promptly replaced. This is called vacancy or supply planting. However good a planting, there will always be a few that will have to be replaced, and it will be specially good plants and good planting that will have less than 1 per cent. of failures by the third year. In a quite new clearing, the earth in the pits will still be soft enough to allow of its being turned over with the hand, and the plants put in as at first. Such supplies should be specially and carefully shaded, and every effort made to allow the new plants to catch up to the others. In the second year, the pits will have to be forked up, or the earth at least well loosened with the hoe before the plants are put in; and in old coffee—*i.e.*, three years or more—the pits will have to be reopened entirely.

The supplies in old coffee will also be dealt with separately, but all vacancies should, when replanted, have greater care, if possible, bestowed on them than at the first planting.

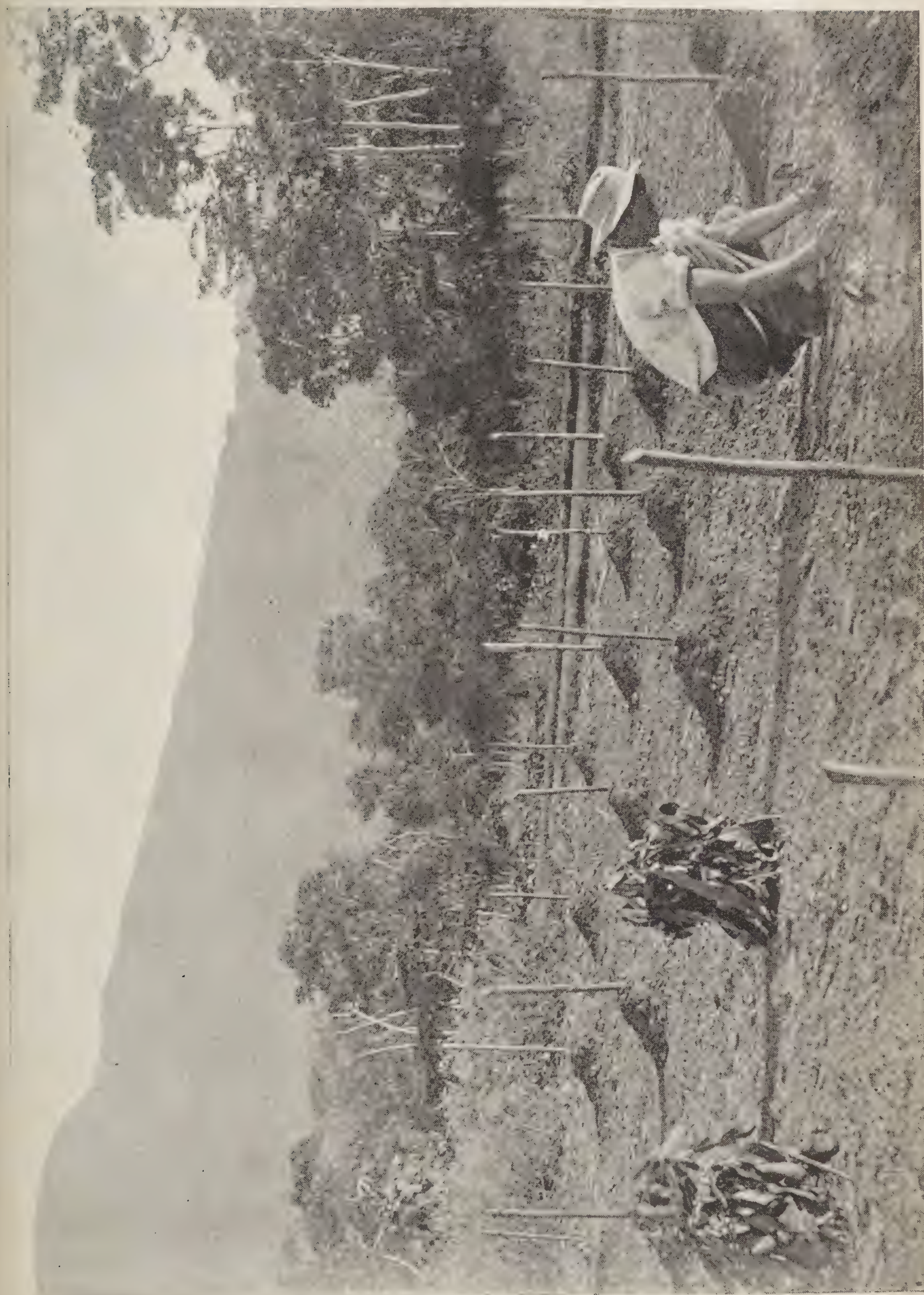
Remember that it is very much easier to get supplies to come on in young coffee than in coffee that has begun to cover the ground.

The first of what may be called the ailments that a young plant will be subject to, though not necessarily suffer from, is "sunburn." This shows as a brown or withered appearance on a soft young leaf, generally the top leaves, of young plants when first put out. It is exactly the effect that frost will produce, but, of course, much milder. It is due to the sudden exposure to the sun, of a plant that has not been properly hardened in the nursery before planting out, or was not shaded when put into the field. When noticed, the plant should be at once shaded as described in last article. If badly burnt, the leaves will fall off, and the plant should then be replaced by a good one, as the eyes from which leaves fall before primaries are formed, very often become blind, and an "umbrella" tree, or one that is all leg and head and no body, results. If not too far gone, light shading will save them. Sunburn may be experienced in a field of young plants that has been covered by weeds on their being suddenly removed; to plants once a year old, sunburn will do no harm, however. A plant that looks yellow, shrunk, drooping, or faded, should at once be examined. It may be found to be suffering from "ring-rot." This is mostly due to excessive dampness, but may be due to exposure to the sun of a little more of the stem than when in the nursery. The cuticles of the bark wither in the unaccustomed heat and light, and the plant becomes hide-bound between wind and water. The effect can be realised if one rolls up one's shirt sleeves a little higher than usual, and works a day or two in the sun. If the ring is complete, the plant is doomed, or at best is not worth waiting for, so replace promptly; if only on one side—and this is ascertained by making a small scratch through the bark with finger-nail or penknife and noting the colour—mulch up with loose earth, and the plant may recover.

If not suffering from "ring-rot," the plant may be "ring-barked" by grubs. This is done by a variety of grubs, and is generally a little lower down than ring-rotting. So dig a little deeper and see. If ring-barked, it will be between the first lateral roots and the mature bark above ground, generally about an inch below the surface. If recently cut, try and find the grub; it is seldom far off. If quite, or even three-fourths ringed, pull up and replace; if only a little barked, it may recover if mulched up with earth, and any green or dry mulch there may have been is removed.

Grubs are a great trouble in clearings sometimes. A little ring of slaked lime round the stems of plants an inch or so below the surface has been found useful, also soot or ashes, but all these have to be renewed from time to time, especially after wet weather.

Sometimes young plants are ring-barked by grubs just above ground, in which case they must be cut back to the ring and allowed to sucker; in the same way, in older trees, grubs will sometimes ringbark them two or three feet



PLANTING COFFEE, STATE NURSERY, KAMERUNGA, CAIRNS.

above ground. When this occurs, the tree must be cut back to wherever the ring-barking is, and raised again to the normal height by means of a sucker. Ring-barking by grubs in old trees is not so troublesome or so frequent, as a rule, as in young plants.

If neither of these are apparent, something wrong with the root may be expected, such as a twisted or bent taproot. To find this dig deeper, on one side only, so that if anything removable or remediable appears the hole can be filled in again and the plant allowed to recover. If it proves to be a twisted taproot pull out and replace at once. For effect, &c., see article on "Coffee Root Growth" (*Queensland Agricultural Journal*, March, 1900, page 214). A twisted taproot may occur by accident in spite of all care.

A great pest that is occasionally experienced in young clearings is grasshoppers and caterpillars. These eat down the tops and young buds of both stem and branches, occasioning a lot of work and handling. These pests are not very common, though exceedingly troublesome when they do occur. They are generally very local; one estate may be troubled with them, while its near neighbour is quite free. Caterpillars and grasshoppers may be bad one season and never appear again, or one field in an estate may be attacked perhaps for two or more seasons in succession and no others touched. The caterpillars would seem to be mostly the larvæ of moths of various kinds, and the grasshoppers of several varieties.

To remedy such plagues it is necessary to understand the life history of the special insect; occasionally, however, the application of ashes will have good effect, and with caterpillars sometimes a ring of lime on the ground round the tree will keep many off. About the surest remedy for grasshoppers in young coffee is a flock of domestic fowls; but it would always be advisable in the event of any such trouble, as in diseases of any kind that are noticed, to send specimens at once to the Government Entomologist, either direct through the Department of Agriculture or the Instructor in Coffee Culture. The Entomologist would probably be able to suggest remedial measures from his knowledge of the life history of the special insect or disease. An estate kept clean from the commencement is not so likely to suffer in this way as a weedy and ill-kept one.

A young plant of any age up to three or four years may suffer by being "wind-rung." The effect is much the same as in ring-rot, but is caused by the swaying of the tree in the wind which, forming a funnel-shaped hole round the stem of the tree by pressing back the soil, destroys the bark by friction. This funnel is easily formed in loose soft soils in wet weather, and should hot, dry weather follow, the sides cake and very soon rub the bark off if the tree sways again. Even in wet weather continued chafing against the surrounding soil while swaying in the wind will ring-bark the tree, and this must be stopped as soon as noticed. The tree must be staked, and thus prevented from being further shaken in the wind, and the earth pressed back against the stem. If the plants are small, the stake previously used for lining, &c., will be sufficient if put in upright and close alongside the plant, but if older, proper staking will have to be resorted to, which will be described in another article.

A young plant badly rung, especially if drooping, had better be replaced, for the lateral roots will probably be strained, if not rung also. The hole caused by this motion of the plant in wind is often the cause of damage to the roots by water. In the rains the hole is often filled with water which, not being able to get away owing to the caking of the sides, induces ring-rot. In heavy and moist soils, more especially, perhaps, in little hollows in otherwise good fields, an excess of moisture is retained a few feet below the surface. It may occur 1, 2, or 3 feet under ground, but the nature of the soil will change there and be sour and cold. The taproot of a young plant may reach a point where this exists any time up to four years of age, and on reaching it will rot. This rotting once commenced will proceed from the bottom upwards, even into the drier and more aerated top soil, and is fatal to young coffee. The ailment is known as "wet feet." The lateral roots are often not affected,

and so the plant may sometimes live on for some time after being attacked. The effect of wet feet is more often evidenced in dry than in wet weather. When this is observed, and the condition of the lower stratum of soil ascertained by digging, the plants in that patch had best be taken out, and the patch either abandoned or deep-drained, and replanted later on.

In any case, when young plants do not come on and the soil seems to be cold or sour, the pits must be entirely reopened and left open for some time before being refilled and supplies planted. Situations where plants are likely to suffer from wet feet, have frequently, though not always, some indications that point to the necessity for draining before planting at all.

In a few instances I have observed coffee that has been eaten down by wallabies, though in several instances damage has been done by their breaking branches, or even young trees. In the instances observed, only young trees of six to eighteen months old were eaten, and then not to any extent. In many cases the wallabies did more good than harm by topping trees, and showing in a very marked way the advantages of so doing to the grower. The trees thus accidentally topped were in every way better than the tall, overgrown trees left by the coffee grower. Wallabies should be kept out if possible, but fencing with wire netting is expensive on large areas. A stray cow will frequently do more harm in a few hours than any number of wallabies. Horses and cattle take some time to get accustomed to coffee leaves, and often will not eat them, but once the liking is confirmed, stock prove very troublesome.

As a general rule, however, stock will turn away in disgust from a well weeded, clean estate, but will seemingly take intelligent and deliberate pains to break down not only the fence, but the coffee-trees themselves, in getting at the grass, &c., in a weedy garden.

Young plants will stand a considerable amount of drought, not as much as old coffee, of course, but still considerably more than many people imagine. In most of the soils on the coast of Queensland, several months of dry weather will not harm coffee, but in very dry situations young coffee, before it is old enough to cover the ground, may droop and suffer from excessive evaporation of the moisture from the soil. If this goes too far, the plants may be seriously damaged. The effect of drought is to stop the growth and stunt the plant, and sometimes make it bark-bound. The lower primaries die back, and though the plant may recover during the next rains, the check will always be apparent. Watering large areas is out of the question in coffee culture, but if the surface of the clearing is kept loosely chipped or harrowed, and the plants mulched up with loose soil, it will take a very unusual drought to harm them.

Should they be so far gone as to lose lower primaries, they should be stumped—*i.e.*, cut back to within 6 inches or so of the ground, and allowed to sucker again. In the case of sickly trees that are not suffering from any of the abovementioned ailments, trees damaged by weed growth, broken trees, or trees that have over-borne in the third year (*see* article on "Disbudding," *Queensland Agricultural Journal*, February, 1901, p. 112), this stumping in the field may be resorted to with success.

The new shoot will grow quickly and prove healthy, and so long as the root and stock are healthy, will take less time to grow and be safer than replanting.

The planting being done in the rainy season, the loose earth round the young plant will sometimes get washed away in a heavy shower in spite of all care. Any washing away of soil should at once be remedied and the earth replaced. Should a plant happen to be washed right out of the pit, it is better as a general rule to replace it with another plant from the nursery than replant the washed out one.

It does not necessarily follow that all the troubles detailed above will beset a young clearing; but it is as well to know what to do in any case, and the young trees will amply repay the attention.

Beyond this the trees will need very little attention till old enough to require topping and handling. Topping, suckering, and staking will be dealt with next.

SUGAR IN RUSSIA.

In Russia the manufacturers are required by law to export a certain amount of the sugar produced. On that quantity they are allowed a rebate of 1 rouble 85 kopecks per poud (5s. 10½d. per 36 lb.). There are 280 sugar manufacturers in Russia, twenty of whom turn out refined sugars which are mainly used in the home market, as the refined article is too hard for other countries, it being the habit of the Russian peasants, who are the largest consumers of sugar, to hold a piece in their mouths while drinking their tea. Barley sugar is largely used in this manner. The *Scientific American* states that Russian sugar is said to be 99 per cent. pure, and for that reason the best in the world. Russian sugar-stocks pay from 15 to 50 per cent. in dividends annually. There is some demand for Russian sugar in the United States, and some is reaching that market. Two of the largest refineries in Russia were destroyed by fire last May (1900), and the owners were delayed in rebuilding by the scarcity of money, and finally decided to rebuild with a decreased capacity.

COFFEE-LEAF TEA.

An ounce of experience is worth a peck of theory. In the case of coffee-leaf tea, which we described in this *Journal* (Vol. VII., p. 161, and Vol. VIII., p. 221), the adage undoubtedly holds good. Articles have appeared in the *Straits Times Planting Opinion* (Madras), the *Locomotif*, and in other journals published in tropical countries, favouring the use of dried coffee-leaves in preference to either ground coffee or tea. We now print the following letter which fully bears out all that has been said on the subject :—

COFFEE-TEA.

To the Editor *Queensland Agricultural Journal*.

As you invited experiences *re* coffee-tea in the *Queensland Agricultural Journal* of March last, I am very pleased to send you mine. I acquired it when on a selection, on the road to Emu Park from Rockhampton. Having then an experimental plot of about twenty coffee-trees growing, and reading that tea made from coffee-leaves dried was very highly esteemed in some coffee countries, I determined trying it for myself. First, I dried leaves in the sun, but the product was disagreeably tasted when tried. Finally, I dried some leaves in a camp-oven, slung so as to swing over a fire, keeping them constantly stirred until they were dry and fairly crisp. Tea made from them was much enjoyed by all who tasted it; and one who did was the editor of the *Rockhampton Bulletin* at that time, but dead now for years past. He greatly enjoyed it, and my wife and I liked it better than any tea we could purchase. I intend growing a few coffee-trees for the leaves only where I am now, as I am sure if it be only dried properly we could dispense with tea, provided we had sufficient coffee leaves to make our own tea from. To dry it properly is everything. It must be done quickly, and done to a turn; then it has an aroma, and flavour that any lover of tea would enjoy.

THEODORE WRIGHT.

Wellington Point, 1st May, 1901.

CACAO.

As many of the agriculturists of Northern Queensland have gone in for planting cacao trees, it will doubtless be interesting to them to read what follows on pollination and the yield of cacao, which we extract from *Planting Opinion*, Madras.

POLLINATION AND 10 CWT. PER ACRE.

P.O.D. wrote some little time ago to the Ceylon papers :—

Mr. Carruthers, among other things, I believe, is devoting his attention to pollination of cacao flowers, and I have ventured to collect a few ideas on the subject.

If only a tenth of the female flowers that annually appear on a cacao-tree set, 10 cwt. per acre would be common. But there are dangers ahead, and in our endeavours to avoid Scylla it would be well at the same time to have a care of Charybdis.

Thus a tree bearing at the rate of 5 cwt. per acre—and this is surely a low estimate in the event of successful pollination—should yield about 50 average-sized pods per annum. But this is reckoning 300 trees per acre.

It is not probable that the average Ceylon soil will stand the drain of 5 cwt. per acre for very long; therefore systematic manuring is bound to be more or less generally adopted, sooner or later. Nor can it be expected, however much it may be hoped, that so delicate a plant as the chocolate tree has proved itself to be, will absorb and continue healthfully to assimilate the concentrated nourishment of impoverished soil highly impregnated with stimulants. Moreover, the best artificial manure for cacao has yet to be named.

Ceylon planters have only to look about them to be fully assured of the fact that twenty to twenty-five years at a remunerative rate of yield, say 3 cwt. per acre and a hundred trees for every 1 cwt. should be the outside life-limit of the cacao-tree. It is useless to point to individual trees, whose locality is an open secret, whose age may be stated as thirty or forty years, and whose fecundity is astonishing. The comparison fails (1) because the individual tree in question is not one of a number of others planted at say, 12 feet by 12 feet; (2) because cacao so planted will have been treated far more drastically than the solitary tree which bears so munificently; and (3) because, in the case of Forestero (to which these points more especially apply), there is not in the whole island a field of any useful extent planted up with only one particular variety. Such trees are altogether exceptional. So that every twenty to twenty-five years the estate will need to be renewed. For canker will help.

Now, the lower a tree, the cheaper the crop-gathering; therefore suckering will continue in vogue. But the tree having been heavily manured there will be an abundance of "suckers," and this means extra expense. But as the tree will achieve a great spread, this need not be taken into consideration, for these 300 trees per acre will become an impossibility. Probably 150 trees per acre would be nearer the mark.

In order to obtain 5 cwt. per acre from 150 trees, each tree will need to bear 100 pods, and there will probably be no decrease in the expense of manure. Being set further apart the trees are likely to live longer, however; and this is already a big step in the right direction.

To qualify this I am personally acquainted (and concerned) with fields of Forestero cacao whose trees have an average perimeter of 25 feet, and they are not yet at their maximum. Let me, therefore, suggest that their maximum spread will be 30 feet—a low estimate—say, therefore, 50 trees per acre. This indicates that in order to obtain 5 cwt. per acre, each and every tree must bear on an average of 300 pods per annum.

But a tree with a perimeter of 25 feet must, of necessity, be some 15 feet to 20 feet in height, and probably much more. The cost of pollinating, an expensive process at best, now becomes something that may be felt. Picking will be dearer, for the trees will be very tall. Moreover, the cost of seed and the planting of it is not excessive, so not much will be saved by having fewer trees per acre.

Trees planted at 25 feet will find some difficulty at first in covering the ground; therefore weeding will become of more consideration than usual. In order to avoid this, the cacao might be planted at 12 feet or 15 feet and alternate trees cut out later. It is doubtful whether the crop for a year or two will make up for the trees so cut out. There might be two lean years.

Finally, cacao will drop to 15s. per cwt. through overproduction!

Now, the first answer to all this is that there already exist in the Island fields—few indeed!—which give, or recently gave, up to 8 cwt. per acre. But this does not dispose of what may be condemned as a *reductio ad absurdum*, for such fields are of the red variety of which planters are becoming more and more shy. Moreover, any attempt at pollination in such fields would be justified

only if the owner were willing and prepared to cut out and replant every 15 to 20 years. Under such circumstances (8 cwt. per acre) even the greediest planter would be inclined, I surmise, to leave well alone.

Manifestly, then, there is a point at which pollination as fertile as I assume, and apart from the physical capacity of a tree to produce flowers which might set, must cease in order, paradoxically, to become beneficial. So that pollination is to be welcomed more in respect of that cacao which is not giving more than 2 or 3 cwt. per acre; otherwise the trees will become worn out in a very few years.

Some may say, "What though they do become worn? The younger the trees, the larger the pods (the less, therefore, to the cwt.), and the older the trees, the more liable they become to canker. Let us plant up afresh two or three years—(and with *grafted* cacao it is hoped this will be possible)—before we cut out every 20 years, so long as we get our 10 cwt. per acre." Once recognise the fact that the life of cacao-tree as at present cultivated is as stated, and the answer is obvious.

But if it were possible to obtain 8 cwt. to 10 cwt. per acre without cutting down—if, by means of pollination, a sixth of the trees per acre of a virile and prolific variety of Forestero could be made to bear as well as a Criollo field at 300 trees per acre, can there be any choice as to which of the two methods is to be recommended?

But as there is no field in the island of only one variety of Forestero, so there is no field of Forestero in the island which gives—I speak under correction—more than 2 or 3 cwt. per acre; and on the top of this comes pollination.

But is there any known jât of cacao—Criollo, Forestero or Calabacillo—which can be depended on for 300 pods per tree per acre per annum?

For purposes of argument I propose to halve this figure: $2\frac{1}{2}$ to 3 cwt. per acre show a very decent profit. There are Forestero fields giving that now, and successful pollination should double and treble this yield.

And the second answer is that cacao, like everything else, is worth precisely what it will fetch in the market. *Verb sap.*

INDIA-RUBBER IN BRAZIL.

India-rubber forests of large extent have been discovered, it is announced, on the banks of the Niera, one of the tributaries of the Amazon. Several German companies have organised expeditions for the purpose of exploring the district, which is situated about eight days' journey from the great tobacco plantations.

A NEW RUBBER PLANT.

Rubber from the "Hule" plant is reported upon by Mr. P. M. Griffith, American Consul at Matamoras, Mexico. This plant is a species of sage bush, with small leaves and grows to a height of about 3 feet. It grows in the mountainous regions of Mexico, and in Texas, Wyoming, and Nebraska, and is said to contain 40 per cent. of rubber. A process for extracting this rubber was discovered and patented by a Mexican living at Sierra Mojado, and a manufacturing plant has been established at San Luis Potosi by the Monterey Foundry and Manufacturing Co., of Monterey. The plant is automatically fed into cutters, and the cuttings are then lifted by a chain of buckets and dumped into a steam-jacketted mixing tank containing chemicals. The product runs into a hydraulic filter apparatus, where it is subjected to a hydrostatic pressure of 75 lb. to the square inch. The material then runs into settling tanks, where the heavier gum sinks to the bottom and the chemicals and residue are drawn off. The cost of production is said to be slight, but the transport of the material is the chief difficulty, owing to the high freight rates. No mention is made of the quality of the rubber produced.—*Engineering News.*

Forestry.

DURABILITY OF TIMBER.

The durability of timber in a structure will depend very largely upon the season when the trees are felled. As matters stand in Queensland, timber of all sorts is felled and hauled to the mills during the whole year round. Now, it stands to reason that some of this timber, when worked up, will not stand as long as others, for the simple reason that at one period of the year the tree is in full growing vigour, and the sap in full flow. In such a case it is easy to understand that in the necessary process of seasoning timber cut in this condition will shrink considerably, and will be weaker than it would have been had it been cut when at rest, *i.e.*, when the sap is down and the growth diminished. We see railway bridges and culverts built of timber often felled close to the line, and squared on the spot. Directly afterwards, this dressed timber is built into the structure. Then it is tarred or painted. Now, what is the result? The timber is full of moisture. This moisture is confined by the tar or paint, and fungoid diseases are provided with an excellent breeding ground at every joint. Then begins dry-rot. Instead of the logs, after or before dressing, being allowed to season and shrink by evaporation of the moisture contained in them, the shrinking goes on after the beams have been fitted in their places. Hence they warp and twist and open their joints, and the element of danger to the structure comes in.

Mr. James Mann, assistant to the Professor of Engineering at the University of Melbourne in his excellent work on Australian timber, says on this point:—

A slightly better condition is that of putting into the structure, timber which has been felled during its dormant condition. It then contains the minimum moisture a live tree can contain; but it is only better in that it has completed its cycle of structural work, and is in the best condition for felling. It contains far too much moisture to admit of being placed in any important position.

Partly seasoned, lies mid-way between unseasoned and well-seasoned timber. The latter, of course, is less likely to encourage fungus growth than any. But there are other advantages to be gained:—

1. There is little or no shrinkage. If green timber be used the amount of shrinkage is enormous, requiring the constant attention of a man to put in wedges and screw up bolts. This is almost unnecessary when seasoned timber is used.
2. The whole may be finished, tarred, or painted, without incurring the danger of dry-rot.
3. The timber also may be stronger.

The same authority says that one of the peculiarities of Australian timber is the great oxidizing effect it has upon iron. Place an iron bolt through a piece of partially seasoned eucalypt, and in a few days there will be a very considerable coating of rust, while the bolt-hole will be blackened all round.

It is only natural that one should ask the question: *How shall we prevent this decay?* In the first place, *use seasoned timber*; it lengthens the life of the timber 100 per cent. Where seasoned timber cannot be used, *protect those points where decay will first appear*, and use every precaution in order to allow the timber to dry while in position.

Coal tar and paint, while preventing the water from soaking into the wood, also repel the attacks of insects. Hence, *a coating at the joints when dry, will retard decay*. Do not paint unseasoned timber except at the joints.

If trees cannot be felled at the proper time, they may be ring-barked, and allowed to drain naturally. When felled they will be better than green timber.

As there seems to be a great diversity of opinion as to the necessity for tarring decks, beams, and piles, it may be stated that all the reports received of timbers that have been so treated confirm the opinion that *tarring increases the life of a structure*.

Science.

DYES FROM JAMS AND JELLIES.

The professor of chemistry of the Montana State Agricultural College at Bozeman, F. W. Traphagen, recently exhibited to the Senate committee certain pieces of muslin that had been dyed blood-red by coal tar dyes extracted from jellies, jams, preserves, catsups, and canned goods, placed on the market for the people of Montana to eat. He did this to illustrate more forcibly his address favouring the passage of the Pure Food Bill.

"In our experiments this year," said the professor, "we found that jams, jellies, preserves, canned beans, corn, tomatoes, soups, catsups, baking powder were all adulterated. The principal ingredient used in the adulteration of these goods is salicylic acid, which is used to preserve the product. This acid arrests fermentation in the cans and so it arrests fermentation in the stomach. It retards digestion and for that reason is harmful. Its use for such purposes has been prohibited in France and Germany.

"In jams, jellies, and preserves, which are called fruit products in several instances, we found little to indicate the presence of fruit. Of twenty-six samples analysed, all contained salicylic acid and coal tar dyes to give them colour. In a can of strawberry jam we found no evidences of fruit except the seed. We planted the seed to see if it would grow, but it had evidently been cooked with the jam and so the seeds would not germinate. In an experimental station in New York some seeds were taken from a can of strawberry jam, planted, and an excellent crop of timothy hay was the result."

Professor Traphagen exhibited the pieces of muslin that were once white, which had been dyed by the coal tar dyes taken from the samples of jellies and catsups. He said the process they employed enabled them to determine the character of the dye. Coal tar dyes, he said, embodied arsenic as a redeeming agent and were generally considered dangerous.—*Exchange*.

THE FOOD VALUE OF TOMATOES.

The extensive use of tomatoes as an article of food has caused (says *American Gardening*) many inquiries to be made as to their food value. The nutrient present in tomatoes in the largest amount is sugar, while the organic acids are the main substances which give individuality or character. In tables of analyses, tomatoes are given as containing from 92 to 95 per cent. water, .45 per cent. ash, .90 to 1.00 protein, and 3.80 to 4.80 per cent. of carbohydrates. The percentage of sugar, which constitutes the main part of the carbohydrates, is given by various analysts as ranging from .6 to 4.50 per cent. This wide range of sugar is greater than can be reasonably expected in a material containing so little dry matter as the tomato. When calculated on the water-free basis, it would be equivalent to a range of from 10 to 80 per cent. or more of the total dry matter. On the water-free basis is 10 per cent. of the tomato sugar, or is there a larger amount? In view of this lack of uniformity of results as to the composition of the tomato, complete analyses were made of three typical samples at the Minnesota Station by Mr. Harry Snyder.

The results of the three samples are given separately, and these show a considerable difference. A compound sample made up of equal parts of varieties, Acme, Livingston, and Aristocrat, showed it to contain of levulose and dextrose 1.12 per cent. of each, and 1.65 per cent. of sucrose.

Tomatoes are sometimes dried, and this process causes a material change in the sugars of the fruit, and the residue of dried fruits and also vegetables cannot always be taken as representing the sugar content of the fresh substance. Drying in a vacuum would probably be the only way of avoiding these changes.

The tomato contains relatively a low per cent. of protein. The samples tested yielded about 5 per cent.; this fruit is ordinarily considered as containing from .9 to 1.00 per cent. protein. Fifty-five per cent. of the total nitrogen of the tomato is, however, in non-proteid forms. The direct extraction of the dry matter of the tomato gives about .5 per cent. of either extract, commonly called fat.

The composition of the Acme tomatoes as treated exhibits of sucrose (cane sugar) 1.60, dextrose (glucose) 1.12, levulose (fruit sugar) 1.13, protein .50, amides .36, fat .05, malic acid .37, ash .69, insoluble in acid .32, undetermined .25, and water 93.61 per cent. Total solids, 6.39.

When the tomato is to be used for food, care should be taken to retain all of the juice, as the nutrients are present largely in soluble form, and any diminution of the amount of juice entails a corresponding loss of nutrients.

In the canning of tomatoes it is sometimes customary to allow the juice to drain from the solids, with the object of securing a more concentrated product, but experiments show that in 3 lb. of canned fruit without the juice there was a loss, as compared with the same quantity canned with the juice, of 53.11 grammes. An unnecessary loss of 22 per cent. of the total sugar of the tomato resulted from the exclusion of the juices.

Apart from its nutritive worth the tomato has an additional value difficult to determine—its favourable influence upon the digestibility of other foods. The practice of adding a small quantity of sugar when cooking tomatoes is shown by the above to rest on a sound basis.

THE SCIENCE OF BACTERIA.

In *Longmans' Magazine* there is an article on "Bacteria and Butter," in which the writer refers to the investigation of a Russian *savant*, M. Zakherkoff, who carried out an elaborate inquiry into the bacterial quality of the milk supplied to St. Petersburg. The *Farmer and Scotch Breeder* says that the figures he obtained were appalling:—Milk, described and supplied as the purest procurable, was found to contain a minimum of over 10,000,000 and a maximum of no less than 83,000,000 of bacteria in from twenty to twenty-five drops, while in other samples a minimum of 2,400,000 and a maximum of 114,500,000 were found. No doubt the scientist is edified by a perusal of such statements, but the farmer will be content to ask for their confirmation. The part that bacteria play in butter-making is well known, but the scientist deserves a monument who can swear that in twenty drops of milk 83,000,000 bacteria were present.

In this number of the *Journal* we print a paper translated from the French of M. Lignières, on tick fever, in which the figures relating to bacterial life also appear appalling. Not in twenty-five drops, but in one single drop of the blood of an infected bovine, he has detected, by the aid of the microscope 11,900,000 of hæmatozoa, and not only has he done this, but he has shown with what rapidity these infinitesimally small creations multiply or decrease, the rate being about 3,000,000 daily.

How does this compare with the bacteria contained in twenty-five drops of milk? A drop of milk or blood equals $\frac{1}{25}$ of an inch. In a cubic millimetre ($\frac{1}{25}$ inch) M. Lignières finds nearly 12,000,000 hæmatozoa. In twenty-five times the quantity of milk M. Zakherkoff finds 83,000,000 bacteria. By M. Lignières' calculation, there would be in twenty-five drops of blood no less than 300,000,000 micro-organisms. Well may this be called appalling. Yet men of science rarely err in microscopic examination of fluids or any other substance. It may be asked: "How does the scientist count this inconceivable number of organisms?" He does not count them all; such a feat would be impossible. Supposing a man set out to count a billion, that is a thousand millions. If he were to count at the rate of 200 a minute and work twelve hours a day without

intermission, he would take 6,944,444 days or 19,325 years 319 days to accomplish the task. There are, as scientists know, living creatures so minute that a hundred millions of them live and move freely in the space of a cubic inch. The organs and tissues of these micro-organisms have been examined and clearly described by scientists, and yet those organs reach the astounding number of quadrillions. What is a quadrillion? It is represented thus 1,000,000,000,000,000,000,000,000. Now any school boy can show that to count a quadrillion at the rate of 200 a minute would require all the inhabitants of the globe, supposing them to be 1,000 millions, to count incessantly for 19,025,875 years, or more than 3,000 times the period during which the human race has been supposed to be in existence. How then does the scientist arrive at the "appalling" figures? Simply by counting those bacteria visible in a fraction of a cubic millimetre. Then, as the bacteria are usually uniformly distributed, it becomes an easy matter to calculate the number per cubic inch by mere multiplication. Suppose it were required to know how many of any kind of small seed, such as cress, kale, or any other variety, go to the 1 lb. weight. No man would be silly enough to start and count them. All he has to do is to take, say, 100 seeds and weigh them. Suppose them to weigh 1 gr., then multiplication by 7,680 (the number of grains in a pound) gives him 768,000, the number of seeds in 1 lb. So with counting any micro-organisms.

A NEW METHOD OF PRESERVING FRUIT.

Amongst the many experiments which are constantly being made for the preservation of ripe fruit, the latest, and apparently the most successful, has lately been made in London. The patentees of the new method are the Messrs. Lawton, and the apparatus is called the Lawton. This consists of an air-tight storage room. From this, when the fruit is introduced, the air is withdrawn, and in its place sterilised air is allowed to enter.

We have no details as to the cost of production of the sterilised air, but it is stated that it is easily and economically produced, and with one quarter of the expenditure of power required in the ordinary process of refrigeration.

An experiment is reported in the British journals, which goes far to prove the claim of the inventors that fruit may be picked ripe and sent to any part of the globe, that it can be stored in a ripe condition for a protracted period, and when sent on a voyage will reach its destination in perfect condition.

The experiment consisted in placing bananas, pineapples, English hot-house grapes and tomatoes in a chamber fitted up at 57B Hatton Garden. The chamber was duly sealed up, and three weeks later was opened by Mr. Eason Wilkinson, principal of the Horticultural College, Swanley, and Mr. M. Ashbee, superintendent of Covent Garden Market. These gentlemen both declared that the fruit was in exactly the same condition as when placed in the chamber, and of identical taste and flavour. The bananas remained as green as when they were shut up. The temperature of the room was about 47 degrees Fahr.

If this experiment is repeated and the ripe fruit subjected to a sojourn of two months in the storage chamber, and should it then be found to be identical in appearance, taste, and flavour, as when first stored, we shall begin to consider that the world's markets will be open to the most delicate of Queensland fruits. Our pines, granadillas, passion fruit, bananas, mangoes, oranges, &c., could in such case, be gathered when ripe, and when the full flavour is developed, and find a remunerative market in London and other great cities of the world. There would, presumably, be no difficulty in fitting steamers with air-tight chambers. All that would be required would be to see that the proper temperature is maintained. We trust that the new method may prove an unqualified success.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1900.										1901.		
	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
<i>North.</i>													
Bowen ...	0·88	0·59	0·89	1·14	0·96	0·76	0·12	0·31	0·05	2·30	17·25	6·23	8·26
Cairns ...	8·90	3·77	3·56	1·66	0·20	Nil.	2·44	1·52	1·61	4·19	11·53	22·09	14·93
Geraldton ...	8·86	8·86	8·33	2·34	1·02	Nil.	2·63	3·17	2·39	18·68	23·32	32·93	37·64
Herberton ...	1·97	2·19	0·57	0·12	0·98	Nil.	0·74	Nil.	3·11	4·01	8·25	4·16	10·95
Hughenden ...	0·01	Nil.	0·11	0·02	2·45	Nil.	0·14	Nil.	0·10	0·61	1·62	1·41	2·82
Kamerunga ...	8·60	3·25	3·65	Nil.	0·18	0·03	1·42	1·98	1·28	2·38	15·91	22·36	13·09
Longreach ...	Nil.	Nil.	0·14	Nil.	2·34	0·50	Nil.	Nil.	0·19	0·11	0·41	0·22	3·09
Lucinda ...	4·90	4·44	9·08	1·10	1·04	0·08	0·44	1·33	0·88	2·48	31·80	24·76	15·78
Mackay ...	4·12	2·40	2·89	2·00	3·25	0·74	1·19	0·48	0·12	7·00	24·85	8·99	10·13
Rockhampton ...	1·64	0·93	1·38	0·71	1·70	0·92	2·52	0·53	1·15	0·68	0·49	8·26	5·53
Townsville ...	1·68	0·87	2·31	0·41	0·57	0·12	0·25	0·91	0·05	0·76	14·91	12·94	4·95
<i>South.</i>													
Barcaldine ...	0·09	2·03	1·38	0·29	4·38	1·63	0·03	Nil.	0·30	1·20	0·15	1·17	3·70
Beenleigh ...	3·16	1·25	7·55	2·18	4·77	1·06	1·90	0·26	2·80	1·49	5·99	4·30	11·44
Biggenden ...	2·81	0·28	3·06	1·43	3·23	0·98	3·07	0·87	1·65	0·06	1·11	2·55	6·19
Blackall ...	0·63	0·63	2·19	0·33	2·21	0·66	0·12	Nil.	0·29	0·17	0·29	0·90	2·28
Brisbane ...	3·37	1·38	5·45	2·68	4·36	0·79	1·52	0·14	2·48	0·55	3·43	2·96	11·70
Bundaberg ...	1·86	1·15	3·97	1·46	5·20	1·14	1·56	3·05	1·06	1·28	2·34	2·61	3·17
Caboolture ...	5·66	1·42	7·04	2·14	3·73	1·56	2·94	1·99	0·86	2·11	1·11	5·51	11·53
Charleville ...	0·79	Nil.	1·15	1·31	1·80	0·13	0·59	0·13	0·19	1·13	0·19	0·22	1·10
Dalby ...	2·80	2·46	2·54	1·29	1·70	1·72	1·67	Nil.	1·77	3·37	2·89	0·44	4·77
Emerald ...	3·97	0·42	2·72	1·15	3·96	0·52	0·35	0·18	0·31	1·08	3·65	4·43	3·25
Esk ...	4·73	1·50	4·78	1·89	2·85	1·39	3·00	Nil.	1·35	1·80	3·99	3·15	8·36
Gatton College ...	3·13	2·24	4·24	1·15	2·73	1·33	2·81	Nil.	4·12	0·47	6·27	1·54	6·73
Gayndah ...	1·11	1·22	2·57	0·88	3·36	1·42	3·28	3·21	1·84	0·08	1·22	2·10	4·22
Gindie ...	1·04	0·96	3·01	0·92	3·01	0·55	0·22	0·27	0·49	1·32	1·57	1·62	2·07
Gympie ...	2·76	1·05	3·63	0·82	3·34	0·84	5·67	0·18	0·84	0·47	2·57	3·10	18·56
Ipswich ...	1·85	1·47	4·73	1·45	2·25	1·17	1·37	0·01	3·93	0·47	2·09	2·88	7·01
Laidley ...	2·87	1·94	4·36	1·41	2·28	1·08	2·39	Nil.	4·55	0·63	4·01	1·58	6·94
Maryborough ...	3·26	1·17	4·33	1·21	4·32	0·57	3·55	1·22	0·68	1·18	5·03	5·51	11·76
Nambour ...	4·67	2·78	7·77	1·35	3·42	1·81	4·15	0·52	1·91	2·19	4·25	9·13	18·01
Nerang ...	3·06	0·47	18·23	2·84	7·74	1·08	2·79	0·26	3·02	2·92	4·26	4·22	14·91
Roma ...	4·40	0·23	2·07	2·14	2·14	1·05	0·77	0·66	2·20	3·28	1·13	0·11	1·77
Stanthorpe ...	1·87	1·70	3·17	1·22	2·26	1·50	3·98	0·23	2·17	2·16	1·94	0·80	3·95
Taroom ...	2·92	2·11	2·55	1·40	2·46	2·92	2·26	1·47	0·45	0·29	1·40	0·10	3·15
Tambo ...	0·30	0·02	2·94	1·49	1·75	0·59	0·19	Nil.	1·87	1·52	0·52	0·51	1·66
Tewantin ...	5·36	1·02	5·90	3·03	5·89	1·97	5·78	1·48	0·74	0·95	7·04	14·18	20·33
Texas ...	1·63	1·48	3·35	1·86	2·72	0·66	2·68	0·35	2·67	3·33	1·29	1·35	4·58
Toowoomba ...	2·87	2·00	4·67	1·69	2·47	1·35	1·95	0·43	2·42	2·40	3·60	1·76	6·84
Warwick ...	1·93	1·01	3·31	1·23	1·99	1·11	2·72	0·13	2·01	2·50	2·90	0·26	5·56
Westbrook ...	1·78	1·81	3·04	1·16	1·85	1·18	0·60	0·04	4·59	1·35	1·88	0·73	4·37

CLEMENT L. WRAGGE,
Government Meteorologist.

QUEENSLAND PRODUCTS IN BRITISH MARKETS.

BUTTER.—Australian, 96s. to 102s. ; New Zealand, 96s. to 102s. ; Danish, 110s. to 112s. ; Dutch, 100s. to 102s. per cwt.

CHEESE.—American, 20s. to 49s. ; Canadian, 34s. to 50s. ; New Zealand, 46s. to 50s. per cwt.

SUGAR.—Refined, £16 to £16 10s. per ton ; German beet, 88 per cent., 9s. 6d. per cwt. ; f.o.b. Hamburg (granulated), 10s. 10½d.

SYRUPS.—11s. to 13s. 6d. per cwt.

MOLASSES.—5s. to 6s. per cwt.

RICE.—Rangoon, 6s. 1½d. to 6s. 4½d. ; good to fine, 13s. to 13s. 6d. ; Japan, 13s. 6d. to 14s. ; Java, 15s. to 17s. ; Patna, 20s. to 24s. per cwt.

COFFEE.—In bond (duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.), Ceylon plantation, finest, 84s. to 115s.; peaberry, 60s. to 94s.; small to good middling, 35s. to 58s.; Mocha, 70s. to 90s.; Jamaica, 95s. to 110s.; Santos, 31s. to 50s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{1}{2}$ d. to $4\frac{1}{2}$ d.; Natal, $5\frac{1}{2}$ d. to $7\frac{1}{2}$ d.; Bermuda, 1s. 6d. to 1s. 10d. per lb.

WHEAT.—English, 28s. to 30s. 6d. per 504 lb.; South Australian, 30s. per 480 lb.; Victorian, 31s. 6d. per 480 lb.; New Zealand, 31s. per 496 lb.; Duluth, 35s.; Manitoba, 34s. 6d. per 480 lb. Parcels of Australian wheat afloat are quoted at 28s. 9d. The visible American supply is 60,298,000 bushels.

MALTING BARLEY.—English, 27s. 6d. to 34s.; Californian, 26s. to 28s.; New Zealand, 25s. to 28s. per 448 lb.

OATS.—New Zealand, 26s. to 27s. per 384 lb.; Canadian, 16s. 6d. per 320 lb.; American, 15s. $7\frac{1}{2}$ d.; English, 22s. 6d.

SPLIT PEAS.—31s. per 504 lb.

GINGER.—Cochin, £3 15s. to £4 5s.; Jamaica, £2 2s. 6d. to £2 5s. per cwt.; Calicut, rough, 38s.

PEPPER.—Capsicums, 20s. to 90s.; Chillies, 35s. to 55s. per cwt.

TOBACCO.—Virginia Leaf: Common, middling, and semi-bright, 4d. to 7d. per lb.; colory and good to fine, $6\frac{1}{2}$ d. to 1s. 1d. Strips: Common, middling, and semi-bright, 5d. to 8d.; colory and good to fine, 8d. to 1s. 3d. Kentucky Leaf: Common to middling, $2\frac{1}{2}$ d. to $5\frac{1}{2}$ d.; good and fine, $7\frac{1}{2}$ d. to $9\frac{1}{2}$ d. Strips: Common to middling, $3\frac{1}{2}$ d. to $7\frac{1}{2}$ d.; good and fine, 8d. to 11d. Maryland and Ohio, $4\frac{1}{2}$ d. to 10d. Negrohead and Cavendish: Common and heated, middling to good, fine, bright, and soft pressed, 4d. to 1s. 3d. Columbian, 3d. to 2s.; Java, 4d. to 10d.; Turkey, 4d. to 11d.; Japan, 5d. to $8\frac{1}{2}$ d.; China, $3\frac{1}{2}$ d. to 7d.; Sumatra, 7d. to 5s.; Paraguay, 3d. nom.; Greek, 3d. to 5d.; German and Dutch, 4d. to 1s. 4d.; Manila, 3d. to 4s.; Havannah, 8d. to 5s.; Yara and Cuba, 5d. to 2s.; Esmeralda, 7d. to 10d.; cigars, 1s. 3d. to 40s.; cheroots and cigars, Manila, 2s. to 3s.

WINE.—Wootonga, red, 13s. per dozen bottles to 17s. per dozen quart flagons; waratah, 18s. to 23s. per dozen; fair red wine (Australian claret type), in bond, 2s. to 2s. 6d. per gallon.

GREEN FRUIT.—Apples, South Australia, 10s. to 15s.; Tasmanian, 9s. to 12s.; Tasmanian New York pippins, 13s. 6d.; Victorian, 10s. 6d. to 15s. per case; Australian pears, 16s. to 21s. per case; Australian grapes, 7s. 6d. to 14s. 6d. per case; pine apples, 3s. to 5s. each; oranges, finest Valencia, 24s. to 25s., common, 10s. 6d. to 12s. 6d. per 420; lemons, 10s. to 19s. per case; bananas, 8s. to 14s. per bunch.

COTTON.—Clean upland, 5d. per lb.; Japan market, $5\frac{1}{2}$ d. per lb.

COTTON WASTE.—21s. to 30s. per cwt.

COTTON SEED.—£6 6s. 3d. to £6 10s. per ton.

COTTON OIL CAKE.—Decorticated £6 2s. 6d. to £6 10s. per ton.

COTTON-SEED OIL.—Crude, 19s.; refined, 20s. to 21s. per cwt.

EGGS.—French, 9s. 6d. to 10s.; Italian, 8s. 6d. to 9s.; Danish, 6s. 9d. to 8s. 6d. per 120.

HONEY.—Australian, 20s. to 25s., nominal; Jamacia, 36s.; Californian, 37s. per cwt.

BEE SWAX.—1s. 2d. to 1s. 5d. per lb.

OLIVE OIL.—£36 to £41; eating oil, £50; sublime. £60 to £65 per tun.

LINSEED.—47s. to 55s. per quarter.

LINSEED OIL.—2s. 10d. per gallon.

LINSEED OIL CAKE.—£7 17s. 6d. to £8 per ton.

WOOL.—At the London wool sales on 6th May prices for merino wools hardened, and crossbreds were firm. The following average prices were realised:—Avoca, 6 $\frac{3}{4}$ d.; Merrigal, 7 $\frac{3}{8}$ d.; Bugilbone, 7 $\frac{3}{4}$ d.; Noondoon, 7 $\frac{7}{8}$ d.; Jerilderie, 8 $\frac{1}{4}$ d.; Osaka, 9 $\frac{1}{2}$ d.; Kaputone, 10d. The total quantity of wool catalogued to date since the opening of the present series of sales is 54,423 bales, and the quantity sold 48,467 bales.

FROZEN MEAT.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

New Zealand Mutton.

(Crossbred Wethers and Merino Ewes.)

			May 11.	May 18.
Canterbury	...	...	4d.	3 $\frac{7}{8}$ d.
Dunedin and Southland	...	...	3 $\frac{5}{8}$ d.	3 $\frac{3}{8}$ d.
North Island	...	...	3 $\frac{3}{8}$ d.	3d.

Australian Mutton.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	...	...	2 $\frac{1}{2}$ d.	2 $\frac{1}{2}$ d.
Light (under 50 lb.)	...	...	2 $\frac{5}{8}$ d.	2 $\frac{1}{2}$ d.

River Plate Mutton.

(Crossbred and Merino Wethers.)

Heavy	...	...	...	2 15/16d.	2 $\frac{3}{4}$ d.
Light	...	...	...	2 15/16d.	2 $\frac{3}{4}$ d.

New Zealand Lambs.

Prime Canterbury (32 lb. to 42 lb.)	...	...	5 $\frac{3}{8}$ d.	5 $\frac{1}{4}$ d.
Fair average	...	...	5 $\frac{1}{8}$ d.	5d.

Australian Lambs.

Prime (32 lb. to 40 lb.)	...	...	4 $\frac{7}{8}$ d.	4 $\frac{7}{8}$ d.
Fair average	...	...	4 $\frac{5}{8}$ d.	4 $\frac{3}{8}$ d.

New Zealand Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.)	...	3 $\frac{1}{8}$ d.	3 $\frac{1}{8}$ d.
Ox, hinds (180 lb. to 200 lb.)	...	3 $\frac{1}{4}$ d.	3 $\frac{3}{4}$ d.

Australian Frozen Beef.

(Fair Average Quality.)

Ox, fores (100 lb. to 200 lb.)	...	2 $\frac{7}{8}$ d.	2 $\frac{7}{8}$ d.
Ox, hinds (160 lb. to 200 lb.)	...	3 $\frac{3}{8}$ d.	3 $\frac{3}{8}$ d.

The above prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations for New Zealand and Australian lambs do not include sales of small lambs, or heavies or inferior quality.

HEMP.—New Zealand, good Wellington, March-May shipment, is quoted at £23 10s., and April-June shipment at £23 15s.

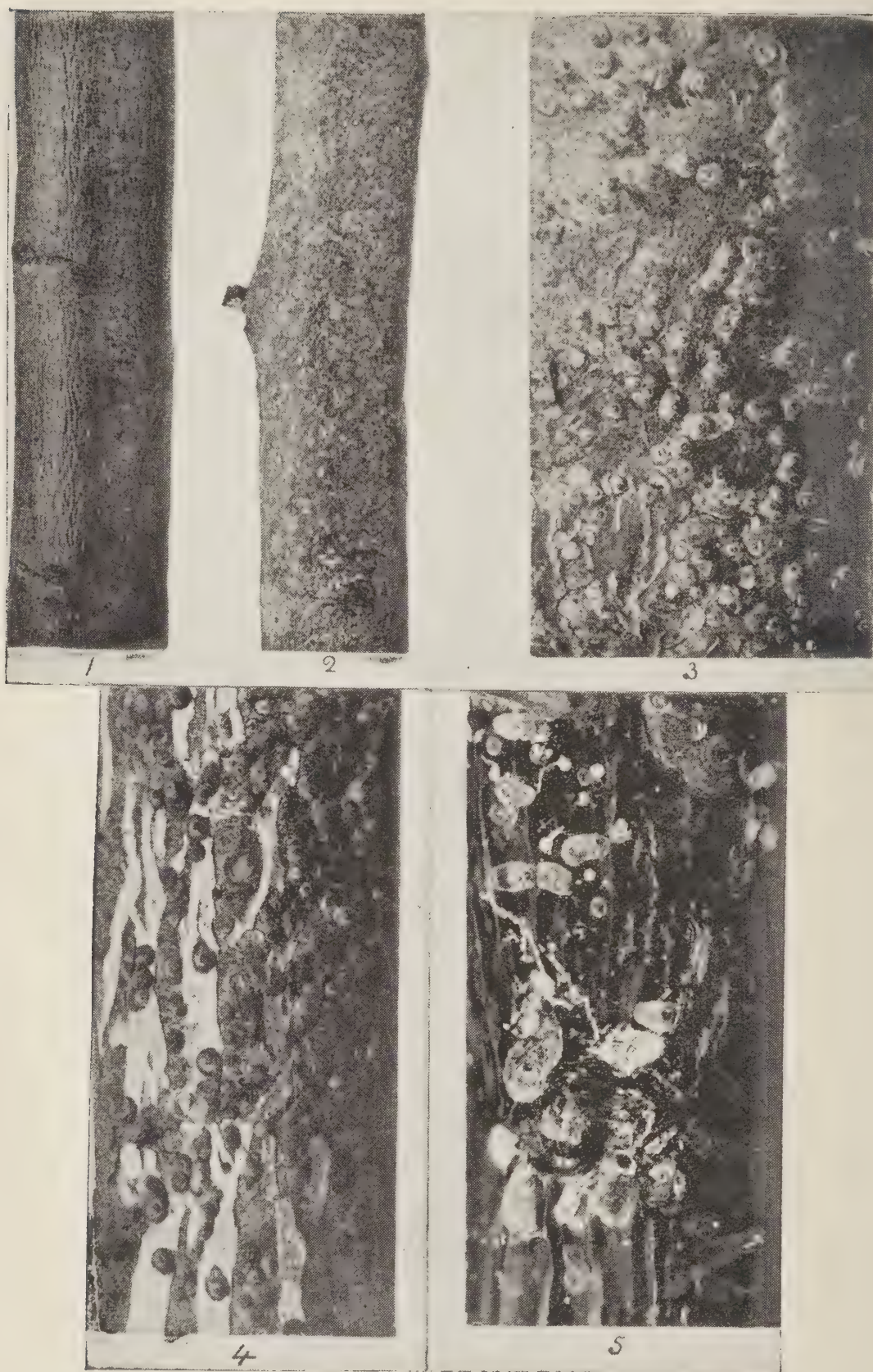
BACON.—Irish, 56s. to 65s.; American, 43s. to 45s.; Canadian, 50s. to 60s. per cwt.

HAMS.—Irish, 42s. to 62s.; American, 44s. to 48s. per cwt.

HIDES.—38 lb. to 46 lb., 3 $\frac{1}{2}$ d. to 4d.; 48 lb. to 56 lb., 4d. to 5d.; 60 lb. to 68 lb., 5d. to 8d. per lb.

SKINS.—Calfskins, 5d. per lb.; sheepskins, 5d. to 6d. per lb.

TALLOW.—Beef, fine, 26s. 9d.; medium, 25s. 6d.; mutton, fine, 28s. 3d.; medium, 26s. per cwt.



SAN JOSÉ SCALE.

- Fig. 1—Apple-tree Bark free from San José Scale; natural size.
Fig. 2—Apple-tree Bark infested by San José Scale; natural size.
Fig. 3—Apple-tree Bark infested by San José Scale; Three times enlarged.
Fig. 4—Peach-tree Bark infested by San José Scale; Three times enlarged.
Fig. 5—Peach-tree Bark, young shoot infested by San José Scale; Six times enlarged.

Entomology.

SAN JOSÉ SCALE (*Aspidiotus perniciosus*).

By ALBERT H. BENSON.

Although this insect has already been minutely described and illustrated in Vol. II., Part 6, p. 494 of this Journal (June 1898) by Mr. H. Tryon, the Government Entomologist, it is deemed desirable, in view of its rapid increase in various parts of this State, particularly the Darling Downs, to again draw the attention of our fruitgrowers to this, the most destructive scale insect attacking deciduous fruit trees.

During the past season the inspectors, under "*The Diseases in Plants Act of 1896*," have reported its appearance in Brisbane on many samples of deciduous fruits grown in various parts of the southern portion of this State, and have stated that it was much more prevalent and widespread than in any previous year. At the various agricultural shows held in different parts of the Darling Downs during the early part of the present year the writer has noticed more or less infested fruit amongst the exhibits, that at Toowoomba being the worst, and at Stanthorpe the least affected.

A considerable quantity of deciduous fruit grown in the Toowoomba district during the past season has been seized by the inspectors on its arrival in Brisbane, and this district seems to be the most generally infected of any in the State, some of the orchards being badly attacked, whereas in others the infection so far is only slight.

The San José scale is only of comparatively recent introduction into Australia, as its presence was first discovered by the writer in 1894, when employed by the New South Wales Department of Agriculture as fruit expert to that State.

In my opinion I am certain that the introduction of this extremely destructive scale was due to the importation into New South Wales of scale-infested fruit trees from California by two or more firms of nurserymen having their headquarters in Sydney, and that it was distributed broadcast both in New South Wales and in this State by these nurserymen, who had agents canvassing the country for the sale of their trees, and disposing of same in large numbers throughout both States. It was introduced into this State prior to the passing of "*The Diseases in Plants Act of 1896*," by the means indicated, as in nearly every instance where I have found it present in isolated or outlying districts I have been able to trace its introduction to trees obtained in this manner.

As already stated, I believe this scale to have been introduced into Australia from California, where it has been known to exist for many years, and where the most strenuous precautions are taken to keep it in check and prevent its further spread, as were it once allowed to get a complete control of the orchards there, the enormous trade in dried, canned, preserved, and fresh fruits, for which this State is famous, would soon become a thing of the past.

It therefore behoves us to take similar precautions to those carried out in California, for should this insect increase in the future in proportion to its increase during the past two years, it will only be a question of a few years at the outside before every deciduous fruit tree liable to its attack will become more or less infested and the industry will receive a decided check.

The San José scale attacks many kinds of deciduous fruit trees in this State, such as almonds, apples, cherries, Japanese plums (*Prunus triflora*), nectarines, pears, peaches, plums, and quinces. Apricots, though attacked, suffer comparatively little injury as a rule.

In addition to these fruit trees it attacks roses and other plants of the same natural order in this State, and has been reported in America as having been found on loquats, walnuts, pecans, persimmons, grape, elm, and other trees. As far as the writer knows, it has never been found on citrus trees or fruit in any part of the world. This scale insect breeds with the most alarming rapidity, and it is often the case that trees that are apparently clean and healthy are one mass of scales in all stages of development a few months later, and the trees, if not already dead or dying, are so infected as to be past recovery without resource to extreme measures, such as heading hard back and treating the trunk and main branches as afterwards described. No scale insect attacking deciduous fruit trees with which I am acquainted spreads as rapidly or is as destructive as the San José, the only insect that compares with it in these respects being the red scale of the orange and other citrus trees, also a species of the same destructive genus *Aspidiotus*.

Owing to the fact that this scale is by no means a conspicuous insect, and is therefore not readily detected on its first appearance, it often obtains a complete hold on the tree before the grower notices that there is anything wrong, and even then the generally sickly and unhealthy appearance of the tree is often ascribed to other causes, and the presence of the scale is not suspected.

However, when one has become familiar with the general appearance of this insect, and of its effects on the wood and fruit of the tree attached, it is by no means difficult to detect its presence, and I will now endeavour to point out in a few words how its presence may be detected by anyone possessing a fair intelligence and the faculty of observation.

San José scale attacks every part of the tree, from the ground to the tips of the smallest twigs. It is seldom found on the leaves, excepting the leaf stalk, but is commonly met with on the fruit.

In the early stage of infestation, it is sometimes difficult to distinguish the insects on the bark of the trunk or older limbs, as the colour of the insect and the bark are very much alike. However, if carefully examined, small, round, blackish scales of the size of a medium pin's head, and having a raised, round point in the centre of the scale will be seen, but there will be no discolouration of the bark. On young wood of the current season's growth the insects are much easier seen, because the bark being thinner, smoother, and of a lighter colour than that on the older parts of the tree, the dark colour of the scale is more conspicuous, and not only that, but on the young wood of pears, apples, peaches, and other fruit trees the scale insect is usually surrounded by a circle of red or brownish-red colour, producing an effect which is very characteristic of this particular scale, and by which it can often be definitely distinguished.

When the scales become more numerous the effects become intensified, the older bark becoming of a slatey-black colour, and the younger bark a brownish-red more or less spotted. In cases of complete infestation, the older bark takes on a very scaly or cankerous appearance and begins to crack; there is often an exudation of gum in the case of stone fruits; the younger branches begin to die back, and if a strip of bark is cut off it will be found to be thickened and discoloured right through. The leaves fall, the wood becomes completely rotten, and finally the tree dies.

The presence of the insect on the fruit is, as a rule, easily determined, owing to the characteristic discolourations surrounding the scale which occurs in most fruits but not always on apples or pears having a russety or dark-green skin. The insects may occur on any part of the fruit, being often pretty evenly distributed over it; but in the case of pomaceous fruits, there is usually a larger number of scales round the eye of the fruit than on any other part.

Although this insect multiplies so rapidly it has been found possible to keep it in check by constant and systematic spraying, as has been proved by years of experience in California, and also in this State in the case of orchards

in the Stanthorpe district, and the orchards at Gatton College, Westbrook, and Hermitage Experiment Farms. There are two main periods of spraying, one during the winter after pruning, when the leaves are off the tree and every part of it can be reached by the spray, and the other when the young scales are hatching out during spring and summer.

The most important treatment is the winter spraying, as this can be carried out at a time that the tree will stand the strongest dose without injury, and also on account of the fact that the tree can then be much more effectually sprayed than when it is covered with foliage, as, no matter how carefully the spraying is done when the tree is in leaf, some part is sure to be missed and to become a breeding ground from which the scales rapidly spread over the whole tree. The best winter spray is the sulphur, lime, and salt wash, which is made as follows :—

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water.

To mix, take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, in a strong iron (not a thin copper) boiler; when the mixture will be of a light amber colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked but still boiling add the 15 lb. salt; when this is dissolved the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half-an-hour longer, when water to make the whole up to 50 gallons should be added. Strain through a wire-seive, and keep well stirred whilst in use.

In making this mixture be careful to use a strong iron boiler, such as is commonly used for preparing pig-feed, &c., for if made in a copper wash boiler, the sulphide of lime which is formed will rapidly eat away the copper, and thus destroy the boiler. This wash cannot be applied by means of a copper knapsack pump for the same reason, but should be sprayed on by means of a strong pump such as Gould's, Nixon's, Dank's, Knowle's or the Doncaster Pump without the kerosene attachment. As the wash is very hard on the hands and clothes, use strong leather gloves and cover the body with a chaff sack in which holes have been cut for the head and arms. Good bamboo extension rods are also essential, and the best nozzles to use should be strong, simply constructed and easily cleaned. One great advantage of the spray over all others is that it is an excellent fungicide as well as an insecticide, and will destroy all moss, lichen, or canker on the bark, and prevent to a great extent the spread of the black spot of the apple and pear, and of the shot-hole fungus of the apricot. Another advantage is that when the spray dries it is readily seen whether the work has been carefully carried out or not, and any parts of the tree that have been missed can receive a second dressing, thus securing the treatment of every part.

The remedies used for the destruction of the young scales when hatching out are not as caustic in their effects as the above, and in order to obtain the best results from their use they require to be applied several times at short intervals so as to catch the succeeding crops of scales as they hatch out, as the younger the scales are when treated the more readily they are destroyed.

The following remedies have been found effectual when applied as suggested at the different Government orchards, viz. :—

WHALE-OIL SOAP AND BLACK LEAF TOBACCO EXTRACT.

Dissolve $\frac{1}{4}$ lb. of whale-oil soap in 1 gallon of water, and add 2 fluid oz. of black leaf tobacco extract, and apply with sufficient force to reach and wet every part of the tree.

SULPHIDE OF SODA AND WHALE-OIL WASH.

Boil 6 lb. of sulphur and 3 lb. of concentrated lye in 2 gallons of water till thoroughly dissolved, and of a dark brownish-green colour. This dark liquid is sulphide of soda. Dissolve 30 lb. of whale-oil soap in 48 gallons of water, add the sulphide of soda to it, boil to thoroughly mix, and add water to make 120 gallons in all and apply.

Where the trees are so badly infested that it is found necessary to head back hard in order to save the tree, the following remedy applied as a paint to the trunk and main branches, will be found very effectual:—

A PAINT FOR THE TRUNKS AND MAIN BRANCHES.

Boil 2 lb. of sulphur and 1 lb. stone lime in 2 gallons of water for an hour and a-half. Then add 3 lb. more stone lime and boil half-an-hour. Make up with boiling water to 2 gallons, and add enough fine flour or fine clay to the mixture to make it of the consistency of thin paint.

I prefer these remedies to the use of kerosene sprays, though the latter are recommended by many orchardists, as I consider that there is less likelihood of danger to the tree, and also that those washes in which lime is used leave such a mark on the tree that it is easily seen whether the work has been carried out properly or not—a very important consideration if you are leaving the work to employees.

TO MAKE A HORSE LIE DOWN.

To make a horse lie down, bend his left foreleg, and slip a loop over it, so that he cannot get down. Then put a surcingle around the body, and fasten one end of a long strap around the other foreleg, just above the hoof. Place the other end under the surcingle, so as to keep the strap in the right direction; take a short hold of it with your right hand; stand on left side of horse, grasp the bit in the left hand, pull steadily on the strap with right hand, and bear against his shoulder till you cause him to move. As soon as he lifts his weight your pulling will raise the other foot, and he will have to come on his knees. Keep the strap tight in your hand, so that he cannot straighten his leg if he rises up. Hold him in this position and turn his head toward you; bear against his side with your shoulder, with a steady, equal pressure, and in about ten minutes he will lie down, when he will be completely conquered, and you can handle him as you please. Then take off the straps, straighten out his legs, rub him gently about the face and neck; handle all his legs, and after he has lain ten to twenty minutes, let him get up. After a short rest go through the same operation again, and repeat it three or four times. The next day give him two lessons, and the following day two more. By this time he will lie down by taking hold of one foot. When he is well broken this way, tap him on the opposite leg with a stick when you take hold of his foot, and in a few days he will lie down from the mere motion of the stick.

FIBRE PRODUCTION BY INDIGO PLANTERS.

The cultivation of fibre-producing plants has lately been taken up rather extensively in India, particularly in the indigo districts, and there would appear to be every promise of satisfactory returns being obtained by the planters. A sample of agave fibre, decorticated by Faure's machine, recently sent home, has been valued at £24 a ton, which should make its production a fairly profitable one to the grower.—*Englishman*.

Animal Pathology.

THE "TRISTEZA," IN THE ARGENTINE REPUBLIC.

From the *Recueil de Médecine Vétérinaire*. by M. Lignières.

(Translated by A. J. BOYD.)

The following very graphic account of the "Tristeza" disease amongst cattle in the Argentine Republic will doubtless be read with much interest by all veterinary surgeons and others who have to deal with bovine diseases, especially as it presents entirely novel features and brings forward facts which have only now been determined by the careful and systematic researches of M. Lignières:—

Under the name of "Tristeza" a cattle sickness is known in the Argentine Republic and in Uruguay, which is identical with the Texas Fever, which has been carefully studied in the United States by Smith and Kilborne. After having attentively read the admirable work of these authors, the subject appears to be exhausted; one gains the impression that, beyond the evolution of the parasite, *Piroplasma bigeminum*, little remains to be done in connection with this point of pathology.

And, after having established conclusively the identity of these two diseases, I should have been able to confine myself in my investigations to applying to the "Tristeza" the data gained on the Texas Fever by these two American scientists.

However, in the course of my researches, doubt arose in my mind on the subject of the exclusive part played by *Piroplasma bigeminum* in the development of this disease of the Argentine cattle. These doubts, the genesis of which will be explained further on, when I shall study the evolution of the parasite and the different forms of the disease, induced me to make a thorough study of the "Tristeza."

If it be true that in the course of this investigation I adduce new and important facts, I must also state that my researches confirm in a startling manner the results arrived at by Smith and Kilborne, results embodied in their memorable work of 1893.

In my book published at Buenos Ayres, I had accepted the name of bovine malaria, as suggested by Celli and Santori.

Since then, further investigations appear to have shown me that there is not an absolute identity in the different ways in which the cattle are affected, and which are determined by the endo-globular hæmatozoa. The name of bovine malaria, which, to my mind, would confound identical affections, must then be held in reserve.

GEOGRAPHICAL DISTRIBUTION.—SYNONYM.—HISTORICAL SUMMARY.

Before commencing the study of the "Tristeza," I think it will be of advantage to draw attention to the localities in which analogous or identical affections have given rise to investigation, to the different names under which they are known, as well as to the principal works on the subject previously published.

The disease was studied in Roumania by Babes, Gavrilesco, Starcovici, Michaelescu, 1888 (Bacterial hæmoglobinuria of the bullock); in the United States by Smith and Kilborne, 1889 (Texas fever); in Finland by Krogus and Von Hellens, 1894 (Hæmoglobinuria of Finland); in Sardinia by San Felice and Loi, 1895 (Hæmaturia of Sardinia); in Australia by Pound, 1895 (Tick Fever or Red Water); in Italy, by Celli and Santori, 1897 (bovine malaria); in the Transvaal by Theiler, 1897; in German Africa by R. Koch, 1898; in Turkey by Nicolle and Adil-Bey, 1899.

At last it spread to France,* Algeria, Tunis, to the West Indies, and to Hamburg.† Furthermore, the information I have been able to obtain concerning Chili goes to show that the disease is not unknown there. This account, necessarily incomplete, suffices to show that the geographical area of the disease is immense. Scarcely ten years have passed since its exact nature was determined.

Yet, its literature is already fairly voluminous, as the close of this work will prove.

In 1888 Starcovici discovered the *Piroplasma bigeminum* in the red corpuscles and shows it to Babes, who studies it;‡ but who does not determine it sufficiently, and believes he recognises it in common bacterial cultures. In the following year Smith and Kilborne publish in the "Journal of the Bureau of Animal Industry,"

* The study of the disease in France will be the object of a special work.

† At Hamburg the disease has been observed on cattle coming from North America.

‡ Statement of Professor Locusteanu, of Bucharest.

Washington, the first results of their investigations which they subsequently completed in 1893. They are the first to indicate with precision the nature of the specific parasite, to which they give the name of *Pyrosoma bigeminum**; its part in the organism, its inoculation by the ticks, and they supply a considerable number of facts and experiences which confer the greatest honour on the laboratory of Professor Salmon.

I will merely mention the names of the authors who have unsuccessfully searched for the cause of the Texas Fever: Dr. R. C. Stiles, 1868; Professor Em. Hallier, John Gamjee, John S. Billings, and S. Curtis, Dr. Salmon, 1883; Dr. Detmers, Dr. Frank S. Billings, 1888; Dr. P. Paguin, 1890; Dr. R. R. Dinwiddie.

As regards the more recent labours of Krogus and Von Hellens, of San Felice and Loi, of Pound, of Celli and Santori, of Theiler, of R. Koch, of Nicolle and Adil-Bey, these entirely confirm those of the American authors.

Very valuable as they are for the criticisms they offer, and for the data of local interest which they furnish, they yet scarcely announce any fact which had not been indicated and well studied by Smith and Kilborne. The "Tristeza" has also been the subject of much excellent investigation in the Argentine Republic and in Uruguay. In January, 1898, a commission consisting of Messrs. Sanarelli, Arrachavaleta, Solari, and Rivas announced to the president of the Rural Society of Montevideo (Uruguay) the result of their investigations. The authors showed in the red corpuscles of the animals affected by "Tristeza" the existence of *Piroplasma bigeminum*, which thus enabled them to identify this disease with the Texas Fever. A few months later, being commissioned to furnish a report on the "Tristeza" to the president of the Rural Society of Santa Fé (Argentine Republic), Messrs. Even and Sivori confirmed the results of the Uruguay Commission and also supplied some clinical information.

I will further mention the monograph of Mr. Leclerc, in which the author establishes the differential diagnosis between the "Tristeza" and the anthrax (charbon).

Still, these studies were so incomplete that Mr. Even thought he ought to give his opinion in a second communication forwarded on 30th June, 1897, to Santa Fé, in the following terms:—

"Considering the millions of piasters which the 'Tristeza' has been responsible for the loss of to the breeder during this year (1897), the *status quo* must not last any longer. The thorough study of this disease is imperative; up to the present it has been scarcely essayed."

The year 1896-97 had been particularly disastrous to Argentine cattle. The breeders were in despair, and foreign Governments began to be uneasy. Then it was that the Association of the Hacendados (graziers) was formed on the initiative of Messrs. F. Terrero, A. Bengolea, and V. Casares. These gentlemen, through the instrumentality of Dr. Antonio F. Piñero, requested the Pasteur Institute to send a specialist to the Argentine to study the infectious diseases of cattle.

Messrs. Nocard and Roux did me the honour to nominate me for the accomplishment of this important mission.

In 1898 the "Tristeza" occurred with such mildness that it was impossible for me, in spite of many efforts, to devote myself to its study. This year, thanks to the hearty co-operation of the Commission of Hacendados, presided over by Mr. Ezequiel Ramos Mexia, thanks to the kindness of Mr. Tidblom, director of the Department of Agriculture, thanks also to the goodwill of several large proprietors, I have been more fortunate. The present work is the result of my extended travels across the Argentine *campo*.

SYMPTOMS AND EVOLUTION OF THE NATURAL DISEASE.†

It is at the particular season immediately following the great heat—the end of February, March, and April—when the weather is heavy and stormy, that the "Tristeza" appears and claims the most victims. But it is not unusual to observe cases during the winter season, when the temperature is scarcely higher than 32 degrees Fahr.

Furthermore, if immune animals are brought into districts where the disease is endemic, it may be seen to break out in them in winter as well as in summer.

The "Tristeza" attacks the bovine race, and, for preference, well-bred fat animals and adults, imported into the infected zones. The calves take the disease in a mild form, very rarely in a virulent form.

* This parasite has also been called *Hemats coccus* by Babes, *Babesia bigeminum bovis* by Starcovici, *Apiosoma* by Wadolleck, *Amcebosporidie* by Bonome, *Proteus virulentissimus* by Perroncito, *Piroplasma bigeminum* by Patten.

† This clinical discovery is completed by the experimental study of the disease.

The symptomatic aspect of the "Tristeza" is sufficiently complex. The appearance of the affected animals is, as a matter of fact, very different according to the gravity of the symptoms, the period of evolution of the disease, the localisations which it may determine, and the surrounding temperature.

Now, to make my explanation clearer, I will describe a mild and a virulent form.*

MILD FORM.

In some cases, unfortunately too rare amongst adult beasts, frequent, on the contrary in the case of calves, the disease becomes abortive. In fact, the animals exhibit no apparent symptoms, not even a rise of temperature, the latter remaining between 39·2 and 39·5 degrees, variations which are also seen in the normal state. The appetite, the muscular energy, the principal functions, the general condition in a word, seem not to be affected. The affection would certainly pass clinically unobserved, were it not that the microscopic examination of the blood, after staining, reveals, during from four to six days, the existence of a very few micro-organisms of the "Tristeza" (one or two infected corpuscles in a whole preparation).

Occasionally the infection becomes more pronounced. There will then be noticed in the affected animals, during from two to four days, a little languor and a slight diminution of appetite. The temperature at this stage rises to 39·8 degrees C., rarely higher; often it remains very near the normal.† The urine is never observed to be red.

This form of disease does not produce emaciation, and in from six to eight days the animals have completely recovered.

The infection may be more important, especially from the point of view of duration. Then may be noticed a slight listlessness, the usual energy is abated, the general appearance of the animal gives rise to a suspicion of some sickness. The appetite has decreased, and is capricious, the temperature rises as high as 40·5 degrees C., 40·8 degrees C.; respiration and circulation are also accelerated. Still the urine is not red.

This condition lasts scarcely more than eight days, after which, improvement is rapid. Convalescence is always of short duration. This attack leaves the animal very slightly anæmic. In all these cases relapses are not rare. One, two, or several months afterwards, the animals may have a second attack, mild like the first, or much more rarely, a serious attack. Observation and experience furnish complete evidence that these mild attacks confer on the animals a certain immunity.

VIRULENT FORM.

It is especially in virulent cases that great variations are noticed in the number, spread, and intensity of the symptoms.

The disease is generally ushered in in a *brusque* (sudden) manner by "sadness" ["Tristeza" is a Spanish and Italian word for sadness.—Translator], a diminution of appetite, a kind of weariness, and a pronounced rise in temperature.‡

In less than twenty-four hours the general condition becomes very serious. The animal has entirely lost its appetite, it dribbles from the mouth, has often a greenish diarrhoea, which becomes yellowish. The temperature rises to 40 degrees or 41 degrees C.; 90 to 100 respirations per minute may be counted, and 110 to 120 pulsations. It either remains lying down or stands up, the head almost touching the ground, motionless, as if stupefied. Hence, doubtless, is derived the name "Tristeza" given to the disease. If it be approached, it raises its head and stares with wide-open eyes either savagely or indifferently.

The urine, which in the morning was of its normal colour, towards evening will probably already show a red tinge. The tint varies from very bright red-like wine well-watered to a brown red, or a coffee colour. This discolouration of the urine is one of the most salient and typical characteristics of the disease "Tristeza." If the animal is with a mob, it will be seen to lag wearily behind, and soon gets separated from the rest.

Animals that are attacked may succumb forty-eight hours after the appearance of the first symptoms, rarely before, and often even three, four, eight days, or even two weeks after the commencement of the disease.

* As regards the experimental transmission of the disease, we shall see that one may recognise, owing to the presence of the hæmatozoa in the blood vessels and to the alteration of the blood, a typical and a non-typical form.

† The surrounding temperature has a marked influence on the rate of temperature amongst animals. Between that taken in summer and that taken in winter, one may observe a difference of from 1 degree to 2 degrees C.

‡ I shall show presently that this *sudden* beginning of the infection is only apparent. In reality the animals have already been infected for the last twenty-four, forty-eight, or even more hours.

The animal may remain standing until the very moment of death. His strength then abandoning him, he falls to the ground, and the death struggle, often extremely painful, commences at once. Then his body is shaken by tremors, which recur at constantly lessening intervals; his breathing is irregular, and the sick beast dies suffocated in making despairing attempts to breathe.

Often the animal is seized with the tremblings before falling. He cannot move without stumbling; streaks of foam constantly pour from his mouth; his expression is vacant or fierce. Frequently the disease rallies all that remains to him of energy and life, and he charges the man on foot or on horseback who approaches him.

At this stage either diarrhoea or constipation is noticed. The excreta exposed to the air rapidly assume a special colour—russet brown, rust colour, or deep chocolate; often they are covered with sanguinary mucus. The mucous membrane and the muzzle have become pale to such a degree that the animal appears to be bloodless. Sick beasts may remain lying down during almost the entire duration of the disease, and die without convulsions, in a sterno-costal position, the head turned towards the belly as if they were asleep. This is mostly observed when the disease lasts more than six, eight, or ten days seldom if it has been of short duration.

The "Tristeza" has not always a fatal termination. Indeed, after having for three or four days exhibited great despondency, a considerable rise in temperature, red-coloured urine, in fact, the whole lot of the symptoms we have just described, the animal begins to walk better. It begins to eat, and move towards some lagoon to quench its thirst, or seeks for some cool spot. It has become very thin to the point of seeming a waster, and shows all the signs of intense anæmia, weakness, extreme pallor of the mucous membranes, which sometimes are yellow, capricious appetite, and staring coat.

At this stage, the urine resumes its normal colour. Further, it contains hæmoglobin only for four or five days at the outside, but it may contain albumen for weeks.

If the animal survives the disease, its convalescence will be of very long duration—two, three, or four months.

In this virulent form cows in calf abort almost fatally, and lose their milk.

Aneurism is extremely rare; I only observed it twice.

During, or after the hemoglobinurea crisis, the animals frequently exhibit various nervous symptoms, either by partial paralysis of the hindquarters or by fits of fury.

Some sick beasts seem to be struck with blindness; they run against obstacles, whilst others walk in wide circles.

Lastly, some animals appear to become a prey to cephalalgia. If they are driven along one notices a sideway balancing of the head, which is very typical, although the sick animals do all they can to keep the head steady.

To complete this clinical description, I think it will be useful to describe a serious epizootic disease, fortunately very rare, which I was able to observe in a large herd.

A cattle-breeder purchased in Buenos Ayres 1,000 cows, immune to "Tristeza," mostly crossbred Durhams in calf, or having already calved. There were about 450 calves.

This herd was driven 275 kilometres ($17\frac{1}{2}$ miles about) further north to the province of Santa Fè, where the disease is endemic. After a journey of twelve days all the beasts arrived in good health at Santa Fè in the early part of May, a season corresponding to autumn in Europe. On the eleventh day [? after arrival—Translator] the first animal died; on the following day five others succumbed, and on the succeeding three days there died 42, 58, and 54 respectively. On the day of my arrival, 60 perished. The plain seemed to have been recently the site of a battle.

For a kilometre (1,094 yards) in all directions there was a cadaverous odour, and on the spot itself an extraordinary sight was to be seen.

Entering the field, I saw about 600 head of beasts, not including calves. They were travelling against the wind in compact groups to avoid the flies (*Stomoxys*), which were numerous. On approaching them it was easy to see that the calves, as a rule, were in good health, and that the adult beasts were, on the contrary, all more or less affected. The latter ate sparingly, marched slowly, painfully, and without energy.

One calf died of the disease before my eyes. Here and there might be seen other little groups composed of animals badly attacked. Further on, scattered over the plain and accentuating the different tracks taken by the herd, were many sick beasts awaiting death or recovery.

All the clinical features were represented in this epizootic disease.

Here was a fine cow, planted on her four legs, her head hanging low. For hours she has probably been in this position, sad looking, scarcely raising her head at my approach, only moving her ears and tail to drive off the flies.

There, another glares at me with savage eyes and charges me; she moves her limbs with difficulty, trembles in her hindquarters, and in running makes the characteristic side-movement of the head. This effort has exhausted her strength; she falls groaning, and stretched out at full length awaits death.

Close by, half lying down, is one which will probably recover, but yet shows the most accentuated signs of anæmia.

Yet again, close by, is a cow kneeling down, her muzzle in the grass; she appears to be suffering violent nephretic pains; her breathing is accelerated, her eye haggard. In a few moments, she rises suddenly and passes a little darkish-red urine, after which she appears relieved. Scarcely had I finished my examination of this cow when a young beast of 14 or 16 months, which appeared slightly affected, started off at a gallop, describing great circles and roaring terribly. Soon he slackened his pace, made smaller circles and fell, an inert mass, his legs doubled up under him as if he had been pithed. Shortly afterwards he died. At the moment of his fall his temperature was 40·1 degrees C. When they are in this state of nervous fury they distinguish nothing. I saw one kill himself against a post.

During this epidemic, the animals always appeared to be better in the morning than in the evening. The forced march, like all other excitements, causes a sensible aggravation of the disease and hastens the fatal end.

LESIONS.

General Appearance of the Carcass.—Usually the body does not swell immediately after death. The graziers have thus a characteristic which enables them to distinguish the "Tristeza" from the malignant carbuncle. This characteristic, however, is not absolute. In fact, I have seen many times during the great summer heats carcasses becoming putrid very quickly, and assuming the appearance observed in anthrax (charbon).

If the disease has been of short duration, death overtakes the subject when in good condition. If, on the contrary, it has been prolonged more than a week, the animal will be very emaciated, and even cachexic.

On the skin will be found little pimples, from which runs a yellowish serum which coagulates rapidly. If the skin is incised at this point, the derma is seen infiltrated and hæmorrhagic. In other cases the cutaneous lesions are less accentuated, being only visible on the sections or on the fine parts deprived of pigment; they then appear in the form of little red spots, and it is easy to explain these alterations by observing at their apex the existence of ticks whose puncture produces a certain amount of irritation.

When the skin is removed, one is struck by the pallor of the hide, by the good condition of the connective tissue and of the fat. In contradistinction to what is observed in most febrile diseases, in this affection it is rare to find effusions and subcutaneous serosities. These lesions exist only when the disease has developed very rapidly, or when there have been secondary infections.

Muscles.—As a very general rule, all the muscles, the cardiac muscle excepted, are of normal colour, sometimes a little pale, but the grain is firm, brilliant, and the gelatinous infiltration of the connective inter-muscular tissue, which exists in a host of other diseases, is rarely met with. In certain districts people habitually eat the flesh of diseased cattle, or even of those which have been slaughtered when actually at the point of death, yet never has the least harm resulted which could be imputed to this practice.

Lymphatic Glands.—The alterations of the glands are often not recognised. Sometimes they are infiltrated with serum, with a hæmorrhagic petechiæ and without œdema of the cellular capsular tissue.

In the virulent "Tristeza," the lymphatic glands, notably those of the intestine, may be red, friable, and even hypertrophied.

Lungs.—These organs have suffered very little. The only alteration found is a little hyperemia. On rare occasions I have found, as did Smith and Kilborne, scattered lesions of an œdematic pneumonia, whose appearance is characteristic to the naked eye; in fact, the serum infiltrates abundantly the connective interlobular tissue, and the pulmonary histological examination shows that the lesions are rather those of simple pulmonary congestion, with very abundant œdema. The capillaries are distended and obstructed by the mass of infected glands.

Heart and Blood Vessels.—In the pericardium is found a slight hæmorrhagic exudation.

On the surface of the heart there are sanguinary effusions which appear under the form of a point or of hæmorrhagic petechiæ of different sizes; sometimes the heart is entirely covered by them.

In the section, the cardiac muscle appears as if it were boiled. This change is one of the most constant.

Under the endocardium are also found hæmorrhagic petechiæ which penetrate the myocardium.

The large vessels do not appear to have undergone any change.

Serous Membranes.—Most frequently the serous membranes are normal and have preserved their brilliant appearance. Occasionally a reddish liquid is found in their cavities, and on their surface, blotches of extravasated blood and a vascular arborisation fairly well pronounced. The connective sub-serous tissue frequently presents a sero-sanguineous infiltration (gelatinous in the neighbourhood of the kidneys) of the stomach, of the capsule of the liver, of the pancreas, and of the duodenum. In this latter region the infiltration may be of great extent and have a thickness of from 1 to 2 centimetres ($\frac{2}{5}$ to $\frac{4}{5}$ of an inch); it covers over partly even the gall bladder.

Spleen.—The spleen is always hypertrophied in size, it may attain to three or four times the normal volume. Its natural colour, shiny blue on the surface, is replaced by a darkish, russet-brown tint. Instead of being soft and elastic, the splenic parenchyma is hard and so friable that the organ easily breaks if not supported along its whole length. Its weight, which in a healthy beast has a minimum of 800 grammes (1 gramme= $15\frac{2}{5}$ grains Troy), may reach from 5 to 6 kilos (1 kilo= $2\cdot20$ lb.) On the section of a normal spleen, small, whitish, rounded grains may be seen, seen, formed by the Malpighian corpuscles, and a greyish network formed by the fibrous trabeculæ. Amongst animals which have died of "Tristeza" this section of the spleen does not present at all the same appearance; there is now only a granulated appearance, badly defined, of a very deep colour, reddening very little when exposed to the air.

The parenchyma is infiltrated with corpuscles partially destroyed and with a yellowish pigment.

This hypertrophy of the spleen does not last long. From the moment of the commencement of convalescence the organ diminishes in volume, and two or three weeks afterwards it has regained its normal size.

Kidney.—The kidney presents a different appearance, dependent upon whether the animal has died during or after the hæmoglobinuria crisis. If death has supervened quickly, gases are soon generated, and the capsule of the kidneys becomes distended, and is of a yellowish or reddish tinge, and sometimes true hæmorrhagic areas are observed in it. The capsule proper is easily removed; the organ itself is increased in volume; its colour varies from deep red or russet-brown to almost black. The section is of a violet hue, very congested; the cortical coating is thickened and friable. The pyramidal region does not detach itself as in the normal state.

If, on the other hand, the animal has slowly succumbed, then, when the urine is not red, the kidneys may be pale and soft; nothing special is found on section.

Under the microscope, the epithelium of the distorted tubes and of the ascending branch of the *hente* appears more or less granulated; the nuclei are badly stained, and may occasionally be completely effaced; at the same time, the lumen of the urinary tubes is more or less obstructed by granulous masses. It has also been remarked, during the hæmoglobinuria crisis, that there exists a dilatation and abnormal obstruction of all the capillaries of the kidney by red corpuscles highly infected.

Urine.—The urine takes various colours, according to the period and intensity of the disease. At the commencement of the virulent form, it assumes a deep yellow tinge, then passes rapidly from bright red to deep red, and may attain a coffee colour. If the animal survives the disease, it presents often a clear green colour. The red tint of the urine is due to the elimination through the renal filter of the colouring matter of the blood—the hæmoglobin. The blood corpuscles are very seldom present. The blood colouring, we know, is not observed in all cases; on the other hand, when it appears, its duration scarcely lasts more than five days. In two cases, the urine became red after it had ceased to be so on the previous evening. The chemical composition of the urine supplies extremely valuable data.

It may be stated, consequently, that the changes in its composition are in direct relation to the progress of the disease, and especially to the intensity of the corpuscular alteration.

Thanks to the kindness of Dr. Abel Ayerza, who was good enough to place at my disposal the services of the chief of his chemical laboratory, Dr. Landolph, I have been enabled to analyse many samples of urine.

These investigations are not yet quite completed; nevertheless, I think it will serve a useful purpose to submit in this place one of those analyses, which will show the changes which took place in the urine of the same animal at different stages of the disease.

CURE OF TRISTEZA (VIRULENT FORM).

(Slow Convalescence.)

Bull aged 18 months. Sick since 8th May.

	Heliogloburin Urine.	Urine of Normal Appearance.	Urine of Normal Appearance.
	11th May (The Bull is very Sick).	16th May (Becoming better since 14th).	29th May (The bull appears to be well).
Colour	Dark red	Greenish-yellow	Light-yellow
Small	<i>sui generis</i>	<i>sui generis</i>	<i>sui generis</i>
Appearance	Troubled	Slightly troubled	Slightly troubled
Sediment	Little	Fairly abundant	Fairly abundant
Reaction	Strongly alkaline	Freely alkaline	Alkaline
Density	1021	1010	1015
Urea	19.44	14.82	13.50
Phosphoric Acid ...	1.30	0.90	0.80
Uric Acid ...	...	0.12	0.19
Chloride of Sodium ...	0.60	1.00	1.70
Optical examination, Urine clarified, and de- prived of albumen	Zone of extinction from - 6° to + 4°	Zone of relative obli- teration 3° to + 3°	Zone of extinction from - 7° to + 5° Champ. (?) fairly intense red
Deviation for polariscope	Visual Field: yel- lowish-green	Lines of interference strongly visible in the two fields	Visual field: rather intense red
Diazo re-action of Ehrlich	None	None	Colour rather intense yellowish-red
Acetone	None	None	A little
Glucose	None	None	None
Albumen	4.11 gr. per litre	0.34	0.14 per litre
Urohæmatine	A little	A little	A great quantity
Biliary pigments ...	A little	None	None
Indican	A notable quantity	A little	A little
Oxyhæmoglobini ...	Much	None	None
Microscopic examination of the sediment ...	Uric acid and sulphate of lime, leucocytes, and epithelial cells	Crystals of triplephos- phates. Some leuco- cytes, epithelial cells	Many crystals of tri- phosphate and hip- puric acid. Indigo. Few epithelial cells, granulations.
Observation	Great diminution of sodium chloride and of phosphoric acid. A great quantity of albumen and of oxyhæmoglobine. Indican. Biliary pigments	Diminution of all the constituent elements. Much less albumen and indican	Remarkable diminution of all the constituent elements. Still a little albumen and much urohæ- matine, notwith- standing the ap- parent state of good health.

Liver.—The liver always appears increased in size, and, as a matter of fact, its weight is from 1 to 3 kilos (2.20 lb. to 6.60 lb.) greater than that of the normal organ. If the animal has died quickly, in three or four days, or else if it has been killed at the beginning of the virulent form of the disease, the liver is greatly congested, the colour violet. The sections appear granulated, and emit a reddish liquid. If death supervenes rather tardily, towards the eighth day, the appearance of the liver is very different. It has an intense yellow tint; its tissue is friable; the section appears dry, the gall bladder extraordinarily distended, contains as much as 1.500 kilo, of a grumous (clotted) bile, thick, at first yellowish-green, afterwards of deeper colour by exposure to the air.

This appearance of the bile is very characteristic and rarely fails. The superabundance of this bile gives evidence of a considerable functional over-activity.

When pieces of the liver are treated with volatile acid, those which proceed from a yellow-coloured organ, assume a bronze-green colour, which fact is explained by the hepatic substance being rich in iron. On the other hand, pieces which are taken from congested livers and belonging to animals which have died quickly, retain the reddish-brown colour.

Digestive Canal.—The histological lesions of the digestive canal are in general small as compared with the intensity of the disease. In many cases scarcely any are found. In others seriously affected which showed diarrhœa, intense congestion of the mucous membrane may be observed, and *almost always clots of blood in the cæcum.* The first

portions of the small gut contain a fluid very rich in bile. In fact, this bile has not ceased to be poured out in abundance in the duodenum; it gives a strong colour to the fœcal matter. The diarrhoea fluid has a powerful odour, a colour at first greenish yellow, which in the air rapidly assumes the russet-brown tint of sienna.

If there is constipation, the excrements are hard, small, reddish, sometimes covered with mucus, streaked with blood. The rectum is sometimes discoloured, owing to the effusion of blood.

At the opening of the stomach, in serious cases, a reddish liquid is found, and on the surface of the intestine ecchymotic spots, red or yellow tumours. The mesenteric glands are in general scarcely infiltrated and hypertrophied; in other cases they are large, plainly infiltrated, rarely hæmorrhagic.

Nerve Centres.—In the greater number of cases, the nerve centres present no abnormal appearance to the naked eye. But whenever these nervous phenomena have been observed (of which I have spoken in the treatise on symptomatology), beneath the pia mater there is found more fluid than in the normal state, and a marked congestion of the meninges and the plexus. In the grey and white substance of normal firmness may be seen a reddish petechiæ. In the spinal canal no characteristic lesion can be noted, except occasionally, a rather large quantity of sub-arachnoidal fluid at the top of the lumbar enlargement.

Articulations.—During the hæmoglobinuria crisis the synovia assumes a reddish colour.

Fœtus.—In serious cases the fœtus is fatally attacked. It shows septic areas, consisting especially of hæmorrhagic exudations. In the pericardium, the pleura, and the peritonæum, a fluid deeply tinged with red occurs. The kidneys are soft, very dark, the liver is congested and friable, the spleen is about normal, the bladder contains a reddish urine.

Icterus (Jaundice).—In the treatise on symptomatology, I alluded to certain cases in which the skin and the apparent mucous membranes took a yellow tint. It is a question of a true hæmaphic jaundice determined, as will be seen, by a corpuscular destruction of extraordinary intensity; besides the skin and the mucous membranes, we find the connective tissue, the fat, the lymphatic glands and the liver of a yellow colour, more or less pronounced.

Secondary Infections.—The organism may also be attacked by secondary infections. It then exhibits almost all the lesions of a septicæm. In these cases, fortunately rare, the muscles are feverish, the colour dirty, they exhale a peculiar odour called "feverish"; the connective tissue and the fat are rose-coloured; the nacreous colour of the lymphatic glands is replaced by a greyish leaden appearance, and in their cavity is a reddish fluid. Certain glands are very hypertrophied; the liver, the spleen, the kidneys, the lungs, are congested; the blood, blacker than usual, coagulates with difficulty; putrefaction sets in immediately after death.

The existence of these secondary lesions renders the diagnosis of the "Tristeza" more difficult.

CHANGES IN THE BLOOD.

MICROSCOPIC EXAMINATION.

Amongst all the lesions which we have just enumerated, the most important, and also the most constant, is the alteration of the blood. The early observers had seen these lesions of the tissues and of the organs, but the modifications undergone by the blood have only been properly studied by Smith and Kilborne for Texas fever.

My investigations on this point confirm the conclusions of the American authors.

The blood of animals attacked by "Tristeza" is almost always bright, pale, as if water had been added to it. On leaving the blood vessels, it coagulates freely, but the clot which forms is sometimes very soft, or becomes reduced to a fibrous network. The serum appears normal if the acute crisis has passed for several days previously. It is red if the disease is at its final stage.

In serious cases, hæmoglobinuria is constant, but the intensity is variable; in fact, the colour of the serum ranges from pink to that of the red wine of Bordeaux. This hæmoglobinuric always precedes hæmoglobinuria, and continues to attenuate two or three days after the disappearance of the latter.

If blood taken from a hæmoglobinuric animal is defibrinated in sterilised vessels containing glass marbles, the appearance of the fluid thus obtained differs entirely from that of normal blood submitted to the same manipulation. Healthy blood in repose shows a red inferior layer formed by the corpuscles and a limpid superior transparent layer of a yellow tint—the serum. This latter only becomes red after several days. If the blood deepens when in repose, a slight agitation causes it immediately to re-assume the vermilion colour which is so characteristic. In the "Tristeza,"

during the acute stage, the blood never shows this vermilion tint, even after agitation. Its colour is always deeper; and when at rest, the inferior layer is observed to be quickly formed of a violet red colour, whilst the supernatant serum appears to be coloured red more or less. It is interesting to see how quickly the colour of this blood becomes deeper by contact with the air, to the extent of taking the tint of pure picro-carmin. Agitation will not remove this dark red hue, and the foam formed takes occasionally the most characteristic yellowish tint. The blood seems to have lost the property of fixing the oxygen.*

In these experiments the serum may be seen to become quickly and rapidly coloured by the colouring matter of the corpuscles, which fact constitutes a proof of their fragility.

As in the case of urine, it was useful to obtain indications of the chemical composition of the blood in order to account for the changes and, if possible, to understand their mechanical action. Dr. Landolph was good enough to once more afford me his kind co-operation. Amongst the results which he has already obtained, I am able to publish the following analyses:—

ANALYSES OF DEFIBRINATED BLOOD.

Blood Normal.	Blood of a Convalescent Animal taken Fifteen Days after the End of the Hæmoglobinuric Stage.	Blood of an Affected Animal taken during the Hæmoglobinuric Stage.	Blood of an Acutely Affected Animal taken during the Hæmoglobi- nuric Stage.
I. Total Residue.			
Two hours in Bain-Marie at 201° 50 per cent.	189·00	165·00	107·00
Twelve hours at 105° 188·00 per cent.	189·50	167·50	111·00
Forty-eight hours at 105° 196·50	189·00	164·00	112·50
II. Ashes of this Total Residue.			
10·00 per cent. ...	9·50	10·00	10·80
III. Iron.			
0 gr. 5534 per cent. ...	0 gr. 5499	0 gr. 6034	0 gr. 7484
IV. Sugar.			
27·00 per cent. ...	14·50	13·50	11·00
The figures here given correspond to the double molecule of the sugar.			
V. Total Inverted Sugar.			
40·00 per cent. ...	30·00	27·00	20·50
VI. Glucose and Protein.			
Reducible one-half by acids.			
26·00 per cent. ...	31·00	27·00	19·00
VII. Co-efficient of Reduction of the Blood.			
Oxide of copper 0·20 per cent., which correspond to	0·50	4·50	5·00
Glucose 0·09 per cent. ...	0·22	2·04	2·27

The mixture of the blood and of Fehling's fluid carried to boiling point becomes of a pronounced emerald green; the small quantity of protoxyde of copper is of an intense yellow colour. It is, therefore sugar which the Fehling solution does not

* Yet there is no methemoglobin. One may ask whether the dark colour of the blood may not be due to a special fixing of the iron.

reduce, and which besides, does not appear to deflect the polarised light. One cannot, therefore, determine it by the optical test. The sugar can only be determined by fermentation. (In urine, analogous sugars are sometimes found.)

The solutions resulting from the inversion of various samples of blood, reduce absolutely nothing and their mixture with Fehling's fluid carried to boiling point becomes, as in the case of blood, emerald green, and under the same conditions.

The only possible determination of the sugars obtained by the reduction by one-half of the glucose and of certain proteids, is that of fermentation.

VIII. *Inversion.*

Blood treated with hydrochloric acid for six or seven hours in the Bain-marie.

a. *Insoluble Residue.*

62·50 per cent.	...	...		36·20		25·50		7·50
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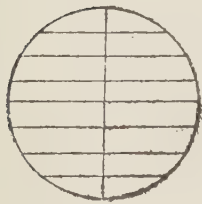
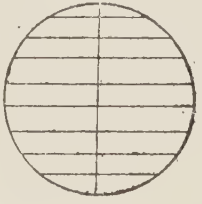
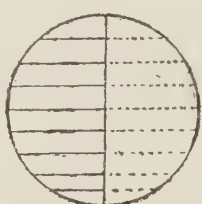
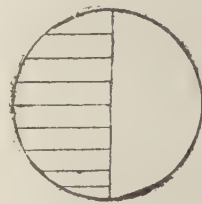
In the diseased blood, this portion collected on the filter paper and dried on the stove is black, shining, and of a resinous appearance. It is insoluble in water, but dissolves easily in washing-lye. It is composed of the iron of the hæmoglobin not dissolved or peptonised by the acid, and probably of the biliary pigments.

The solution of a deep-green, properly spread, shows with the greatest nicety in the spectroscope the band of absorption of the biliary pigments on the right side of the spectrum. Healthy blood gives a much weaker absorption on the right of the spectrum.

The ashes obtained from these residues are of lively yellowish-red, and are partly composed of nearly all the iron of the hæmoglobin and of the oxyhæmoglobin of the blood.

b. *Soluble Residue.*

Polarimetrical Examination.

Deviation ... —77°10	—91°5	—90°5	—66°0
Visual Field Red. Lines of Interference well defined	Visual Field, intense Red. Lines of Interference well defined	Visual Field Red. Lines of Interference slightly visible to the right	Visual Field intense Yellow. Lines of Interference completely effaced on the right
			

This portion is formed of the hæmoglobin and dissolved albumen, of preformed sugar, of the sugar obtained by reduction and further by sundry salts.

The sugar got by reduction must be calculated under the form of glucose. Admitting that a degree of deviation to the left corresponds to 1 gramme of albumen or to analogous matters we shall then have :—

Insoluble portion	77·10	36·30	25·50	7·50
Soluble albumin	62·50	91·30	90·30	66·00
Preformed sugar ...	27·00	14·50	13·50	11·00
Glucose, etc. ...	26·00	31·00	27·00	19·00
Ashes ...	10·00	9·50	10·00	10·80
	202·60	182·60	166·30	114·30

These figures correspond fairly well with the total residue obtained by evaporation of the blood, thus :—

201·50 per cent....	...		189·00		165·00		107·00
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IX. *Total Azote (Nitrogen.)*

Total Azote, 23,801 cc.	22,320cc.	19,909cc.	13,166cc.
80 per cent.			
Azote, 29 gr. 895,	28 gr. 034	25 gr. 006	16 gr. 536
which corresponds to			
azoted matter 187 gr. 26	175·61	156·24	103·34

X. *Azote (Nitrogen) of the Urea and of Analogous Matter.*

Azote of Urea, 2,063cc. 73 per cent.	4,190cc. 60	1,912cc. 15	4,421cc.
Azote, 2 gr. 60 ...	5 gr. 2,634	2 gr. 4,017	5 gr. 5,534
which corresponds to Urea and analogous matter, 5 gr. 57 ...	11 gr. 278	5 gr. 146	11 gr. 900

XI. *Spectroscopic Examination.*

Two bands of absorption in the yellow-green; no absorption in the right side of the spectrum oxyhæmoglobin. Absence of bile and of hæmatoporphirine	Two strong bands of absorption in the yellow-green and complete absorption in the right side of the spectrum. Great quantity of oxyhæmoglobin, probably biliary pigments.	Two strong bands of absorption in the yellow-green and complete absorption in the right of the spectrum. Great quantity of oxyhæmoglobin, and probably biliary pigments.	A strong band of absorption in the yellow; a strong and broad band of absorption in the green and obscure blue. oxyhæmoglobin, probably biliary pigments and hæmatoporphirine.
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CONCLUSIONS.

The parasite of "Tristeza" acts principally on the hæmoglobin and on the albumen of the blood by destroying a great portion of the former by the (fixation?) precipitation of the iron (since it is found again in the ashes of the insoluble residue), and by rendering the hæmoglobin and the albumen more soluble. The quantity of preformed sugar remains pretty well the same, whilst the glucose and a portion of the proteid substances suffer considerable diminution. The blood of affected animals taken at the full acute stage is extremely irritating and toxic. Injected into the peripheral vein of the ear of a rabbit, it kills it in a few seconds with a dose of from 3 to 5 cubic centimetres. The same quantity injected into the peritoneum of a guinea-pig also produces death in a few minutes; the animal is immediately seized with violent convulsions as if liquid caustic had been injected.

This toxic action of the blood has already been announced by Messrs. Nicolle and Adil-Bey. The hæmoglobin crisis having passed away the blood still remains bright for a long time, and only regains its normal properties little by little.

In some cases, the blood of affected animals is very dark immediately on its issue from the blood vessels, and reddens but slightly when exposed to the air. This peculiarity may be observed when the corpuscular destruction has been relatively slight. Finally, some hours before death, the blood may be of the colour of coffee ground, reminding one of the appearance of hæmoglobinuria.

MICROSCOPIC EXAMINATION.

Changes in the Red Corpuscles.

What strikes the observer at first in this examination is the appearance of the corpuscles. They have indeed preserved their rounded shape, but appear discoloured. They no longer are uniformly discoloured. At their centre there is something like vacuoles, others are in the form of a cup, and appear to have a nucleus. They are softer, and can be flattened. They vary very much in size.

Giant Multinucleated Cells.—From the commencement of convalescence, and especially in acute cases, there appear a considerable number of large red corpuscles three or four times larger than the normal size, in which may be seen irregular granulations of different dimensions, taking a strong colour by the blue stain. Some of these giant cells have granulations so fine and so numerous that the blue stain seems fixed in a uniform manner. The appearance of the giant multinucleated cells is a certain indication of the triumph of the organism over the parasites. They do not show themselves ever either during the acute stage or during the return to the first stage of the disease. On their appearance, a few hæmatozoa may still be found, but these are always few in number.

What is the meaning of these pointed corpuscles which take the blue stain of methylene so well?

At first sight it might be thought that they are a specific form of the disease. This is far from being the case, however. As Smith and Kilborne were the first to demonstrate, they have no relation whatever with the agent producing "Tristeza."

These authors have proved that it is easy to induce the appearance of the giant cells in healthy animals by submitting them to repeated blood-letting.

I have many times made this experiment with a similar result. Here is a case in point—

LINCOLN SHEEP IN GOOD HEALTH.

Dates.	Number of Corpuscles per m.m.c.	Bleeding.	Observations.
20 Sept. ...	11,800,000	500 c.m.c.	
21 " ...	8,525,000	350 c.m.c.	
22 " ...	7,781,000	250 c.m.c.	
23 " ...	6,200,000	200 c.m.c.	Final bleeding. Appearance of very few giant multinucleated cells.
24 " ...	5,952,000	...	Many giant multinucleated cells.
25 " ...	4,247,000	...	Many giant multinucleated cells.
26 " ...	4,712,000	...	Enormous number of multinucleated cells. Some ordinary corpuscles are also pointed.
27 " ...	5,115,000	...	Same number of giant multinucleated cells.
28 " ...	6,200,000	...	A few less giant multinucleated cells.
29 " ...	7,440,000	...	The pointed corpuscles diminish.
30 " ...	7,502,000	...	The pointed corpuscles diminish.
3 Oct. ...	8,100,000	...	The pointed corpuscles very rare.
17 " ...	11,700,030	...	No more pointed corpuscles. Blood normal.

The above experiment further shows that with the sheep, one rapidly succeeds in producing a sensible diminution in the number of corpuscles. It must also be noted that this diminution continues for several days after the last bleeding.

These nucleated cells appear to form themselves in the blood itself, for, so to speak, none are found in the spleen, the liver, the marrow, or the glands. Whatever may be the nature of these cells, their appearance is an excellent prognostic sign; it indicates an intense cell repair and the triumph of the organism. Later, I shall, on the subject of the study of the parasite "*Tristeza*," describe also the appearance of *flagella* on the red corpuscles, but only during the acute period.

Diminution in the number of Cells.—The destruction of the red corpuscles is the principal change produced by the parasite.

In the normal state of the bullock a minimum of from 8,000,000 to 9,000,000 corpuscles per cubic millimetre may be counted. In the "*Tristeza*" this number decreases. This cell waste is more or less increased, and generally in direct ratio to the intensity of the infection. In the mild form of the disease the decrease is scarcely noticeable, and is particularly slow; it lasts from four to eight days. Occasionally, however, the number of corpuscles may fall to 4,000,000 per cubic millimetre. In the virulent form and at the final stage the cell destruction attains truly extraordinary limits. In the first twenty-four hours the animal only loses from 1,000,000 to 2,000,000; on the following day, from 4,000,000 to 5,000,000. In one case, I saw the number of blood corpuscles fall at the outset from 8,200,000 to 1,800,000, and on the next day a few hours before death at 31,000 only.

A no less curious and interesting fact to note is the power of reaction possessed by the organism against this truly formidable anæmia. In fact, certain animals in which the number of the corpuscles had fallen to 300,000 only per cubic millimetre, were able to entirely recover their health.

Life is not compatible with such a restricted number of cells; hence, in an animal likely to recover, a sudden rise in number occurs from the fourth or fifth day; the number rises rapidly to 3,000,000 per cubic millimetre.

Then, after this increase which ensures life, recuperation becomes slower. Some affected beasts have taken several months to recuperate 7,000,000 of red corpuscles.

All these measurements have been scrupulously calculated and repeated frequently by Hayem's method. It will be noticed that by this method we obtain slightly higher figures than are given by Zeiss's hæmatimeter. However that may be, all the figures I have given are perfectly comparable with them, since they have been obtained under identical conditions.

I shall return to this matter of cell destruction when describing the effects of experimental inoculations. I shall then show that in certain *atypical* cases, the cell destruction has no relation to the symptoms and to the observed lesions. One certain fact, which confirms the observation made and reported by Ponfick is, that the hæmoglobin demands for its production, as a preliminary and necessary condition, a *rapid* cell destruction.

The rapidity of this destruction is in its nature an etiological factor far more important than the quantity of cells destroyed.

An animal may lose, in from five to eight days, from 3,000,000 to 4,000,000 of red corpuscles per cubic millimetre without, for all that, showing the hæmoglobin, for the organism has had time to transform and eliminate the hæmoglobin dissolved in the blood. On the other hand, if this waste goes on rapidly, the hæmoglobin does not delay to appear in from twenty-four to forty-eight hours.

This fact has also been announced by Kelch and Kiener as occurring in the human malaria.

This study is certainly one of the most attractive. Better than any other diseases, the "Tristeza" will facilitate experimental researches having reference to destruction and cell reparation in general, to hæmoglobin, to hæmapheic jaundice, and to hæmoglobin.

PARASITE OF THE TRISTEZA (*Piroplasma bigeminum*).

The microscopic examination of the blood reveals another principal point—the presence of parasites in the red corpuscles of the general circulation, of the capillaries, of the viscera, and tissues.

If Starcovici and Babes were the first to discover and indicate the micro-organism, it is to Smith and Kilborne above all that we owe the precise knowledge of its nature and of some of its properties. They gave it the name of *Pirosoma bigeminum*. This name indicates both the very characteristic pear-shape of the micro-organisms and the peculiarity which they often present of being joined together in pairs. Patton, however, has pointed out that this name had already been used on another occasion; he therefore proposed that of *Piroplasma bigeminum*, which is to-day generally accepted.

EXAMINATION OF THE BLOOD.

The blood may be examined either in its fresh condition without the addition of any staining matter, or after having exposed, fixed, and stained it.

Several methods of staining have been indicated; one of the most simple consists in exposing a drop of blood in a thin coating on a cover glass, waving this about in the air until the coating is dry, and floating it for five minutes in a solution of equal parts of alcohol and ether, or into absolute alcohol for twenty minutes; after which, the preparation is again dried by agitation, without the intervention of flame, then it is stained for thirty minutes, with an aqueous solution of methylene blue at $\frac{1}{2}$ per cent. The hæmatozoa then appear of a pale blue, and the cells a very light green.

Carbolic Thionine has also been employed successfully, especially that which has been attenuated by age. These colours are far preferable to violet or to hæmatoxylon (a logwood). As for eosin, fuchsine, and saffron, they only serve to stain the cells when it is desired to obtain a double staining. For the examination of hæmatozoa I have always rejected the methods by double staining, keeping in preference to the blue.*

The hæmatozoa do not take the stain uniformly. Usually the centre remains almost unstained, and sometimes one or more small rounded points are seen on the periphery, especially towards the distended part, more strongly stained. The shape of the hæmatozoa is very variable. Some are pyriform, in which case one or perhaps two are found united by their fringed extremity; this is the characteristic appearance. Sometimes four are found in the same cell, or again three, in the shape of a trefoil. Others appear polygonal, more or less irregular, and take the stain very faintly. Often they present themselves in a fairly regular round shape. These take the stain best, and most uniformly. The number and volume of the hæmatozoa also vary in an important manner. Some, especially the spherical ones, are very small; others almost completely fill the cell.

In a single preparation may often be seen 25 or 30 per cent. of infected corpuscles, whilst a quarter of an hour may often elapse before a *Piroplasma* is found. The richness of the blood in infected corpuscles varies accordingly as that of the general circulation, that of the capillaries, or that of the different organs is examined.

I have been able to prove, like Smith and Kilborne, that the hæmatozoa are especially numerous in the cardiac muscle and in the kidneys. Many are also found in the capillaries of the intestinal membrane, fewer in the blood of the large arteries, the pancreas, the spleen, the liver; very few in the bone-marrow, in the congested glands, the capillaries of the brain, and the thyroid bodies. In acute cases the infection is so generalised that all the organic fluids containing red corpuscles, contain also hæmatozoa. Sometimes in the brain substance the capillaries are distended by a great quantity of infiltrated blood, infected by the parasite. This circumstance readily accounts for the nervous phenomena observed during the course of the disease.

* This does not hold good for the study of the micro-organism, in which work I have especially employed the methods of Romanowsky and of Laveran.

The hæmatozoa may also be found outside the corpuscles, notably in the kidneys and in the cardiac muscle. In the same way the *Piroplasma* may be found free in the serum, in the capillaries and even in the large bloodvessels. They are often only apparently free, since by a very careful examination they will be seen to be enclosed in blood corpuscles, entirely deprived of hæmoglobin. Yet, there really are pyriform micro-organisms circulating freely in the blood in consequence of the total and rapid destruction of the red corpuscles.

The number of hæmatozoa varies, again, according to the intensity of the infection and the stage of the disease. In fact, if, from the moment of the appearance of the virulent form of the disease "Tristeza," blood is taken every day from the jugular vein of an affected animal, the number of *Piroplasma* will be seen to increase during three or four days, and then to diminish suddenly, so much so as to become very rare. Soon, indeed, and whilst the animal is still sick, the greatest difficulty is experienced in finding a single hæmatozoa.*

So far, the foetal blood has never yielded me any hæmatozoa, however severe might be the disease of the mother.

I direct attention particularly to the following point:—If, after having exhibited all the symptoms of the disease, the animal dies on the eighth or tenth day, the changes which characterise the "Tristeza" will be found at the autopsy without hæmoglobin; but it will be very difficult, *even impossible sometimes*, to demonstrate the existence of *Piroplasma bigeminum*.

Up to the present, sufficient stress has not been laid on this very important fact. At the beginning of my researches in determining the symptoms and most of the phases of the disease, without being able to discover the hæmatozoa or finding them in extremely small numbers, I asked myself if indeed the *Piroplasma bigeminum* were the exclusive agent of the "Tristeza."

It was only subsequently, in again making a complete study of the disease, that I was able to prove that this parasite does not long remain visible in the corpuscles, and that in atypical cases, as we shall see further on, it may even be totally absent from the blood of the general circulation for almost the entire duration of the disease.

The examination of fresh blood presents points of great interest. Its *technique* is most simple.

It is sufficient to deposit a very small drop of blood on a very clean glass slide, to place over it a cover glass, the edges of which are smeared with paraffin, and to place the whole under the microscope. It is also of advantage to dilute the blood with a saline solution of 7 per cent. strength, and then to make the microscopic examination on the warm stage. If normal and diseased blood are comparatively examined, it will be seen that in the former the corpuscles have almost always a tendency to send out little points, and to become crenated, whilst in the latter they appear discoloured and increased in size, some appearing with a clear matrix, but better preserving their round shape. During the hæmoglobin stage, hæmatozoa are found in the corpuscles, having the appearance of bright spots, retracting and intruding on the cell protoplasm. They are pyriform or spherical, swollen, more or less deformed or foliated.

If the preparation is rapidly manipulated, or if the examination is made on the covering glass, the bigeminate hæmatozoa will easily be seen to change their position during the first few moments. They appear to roll over each other, incited by some oscillatory movement.

In following these movements it would be thought that the micro-organism changes its shape. In reality, the appearance of this little pear, which constitutes the hæmatozoa, varies accordingly as it appears in a vertical, oblique, or horizontal position.

Smith and Kilborne thought they recognised in this phenomenon a special property of the hæmatozoa—that of changing their shape by amœboid movements. Yet this is not so. The pyriform hæmatozoa have not got this property. They have only, as we shall see, the power of slowly retracting their protoplasm to take the spherical form without any further change.

In the interior of the *Piroplasma* there are often seen several little brilliant specks, apparently mobile, and considered up to the present to be nuclei.

The examination of the fresh blood is often negative, however, when the micro-organism is in evidence by examination after staining.

I should here mention a cause of error which I have often proved.

Especially amongst the slightly affected cattle, the red corpuscles observed in the fresh state quickly become crenated; the little spikelets which form on the surface project at the moment of changing the micrometric screw, small shadows appearing like

* We shall see, with respect to immunity, that the *Piroplasma* does not disappear entirely from the organism, and that it is found at long intervals, even in the blood of the jugular vein.

spots alternately darkened and refracting, often in pairs. It is soon perceived that they exist in all the crenated cells, and that they in no way indicate the presence of *Piroplasma*.

Finally, when the blood is examined at the moment of its active reparation, one sees, alongside of the little hæmorrhagic areas, a great number of larger cells, some of which enclose in their protoplasm many refracting bodies, slightly mobile, which must not be taken for hæmatozoa. They are those giant multinucleated cells of which I have spoken above.

EVOLUTION OF THE PIROPLASMA BIGEMINUM.

Smith and Kilborne have, in their work, sought to account for the different phases of the development of the *Piroplasma bigeminum*. The results of their researches are incomplete. Nevertheless, they have adduced an important fact—viz., the transformation of the pyriform to the round hæmatozoa. According to these two scientists, the pyriform appearance of the parasite would correspond to the virulent form of the disease, the mild form being caused by very numerous punctiform micro-organisms, situated especially at the periphery of the corpuscles. They also speak of very fine mobile bodies, endo-globular, but they confess they are not quite decided as to their significance or their function.

In his *mémoire* of 1898, R. Koch said that he had found, in severe cases, quickly fatal, the early stage of the microbes, having the appearance of bent rods, at times resembling a ring, or shaped as a willow-leaf, moulded to the shape of the outlet through which they escape. Finally, whilst this *mémoire* was in course of preparation, I became aware of a work on the evolution of the *Piroplasma bigeminum*, recently communicated to the Biological Society by Messrs. Laveran and Nicolle. These scientific experimentalists made their investigations of stained preparations by the following method:—

“The blood dried in a thin layer on cover glasses is fixed by heat (110 degrees C. for several minutes), and afterwards by the aqueous saturated solution of corrosive sublimate (one minute). This blood being well fixed, is floated in the following solution:—

Aqueous solution of eosin at 1 p. 1000	...	...	...	...	5 cc.
Distilled water	...	...	...	...	4 cc.
Borrel blue*	...	...	...	...	1 cc.

“In an hour or two the preparation is washed carefully in running water, and is then treated with a solution of tannin—5 per cent. for about a minute. Again it is washed, dehydrated, and then mounted with balsam. Before mounting, the preparation is examined in order to make sure that the staining is good; if it is too deep, it is discoloured by absolute alcohol. The nuclei of the micro-organism should be stained violet red.”†

Messrs. Laveran and Nicolle have thus observed the hæmatozoa under two principal aspects:—

1. Small, spherical, or oval elements.
2. Pyriform or geminate elements.

Furthermore, they have distinguished in the rounded forms a small network or *karyokinesis*.

According to these authors, the *karyokinesis* becomes elongated, then divides into two. The two *karyokineses* thus formed, at first joined, separate and place themselves at the extremities of the limiting wall of the cell. Then the protoplasm in its turn divides to form two pyriform elements.

Such are the main points of the communication of Messrs. Laveran and Nicolle.

These authors worked under less favourable conditions than those under which I undertook my observations. Hence, doubtless, the difference between the results they obtained and those which I am now about to describe.

Technical Description.—I have followed out the evolution of the *Piroplasma bigeminum* simultaneously on fresh and in stained preparations.

For the fresh preparations, the blood is always diluted, either in salt water at 7 per cent. or in bullock serum. A dilution must be obtained such that on

*Borrel blue is obtained as follows:—A solution of nitrate of silver is treated with a solution of soda; the oxide of silver precipitated is carefully washed; a concentrated solution of methylene blue is poured into the flask which contains this oxide; the solution is shaken up. It is then left for several days, and then decanted. (A. Laveran: Biological Society. Meeting of 15th April, 1899.)

†A. Laveran and Nicolle: Contribution to the study of *Piroplasma bigeminum*. Biological Society, 19th July, 1899.

preparation there will be a certain interval between the cells. It is impossible to lay down beforehand the degree of dilution necessary, because the cell richness of the blood is exceedingly variable.

In the salt water the cells change less rapidly than in the serum, but, on the other hand, the latter preserves the hæmatozoa better. I have also operated with a mixture of equal parts of serum and salt water.

After having obtained these solutions free from all germs, prepared the warm stage under the microscope, washed in ether and absolute alcohol the parts which would be in contact with the drop of blood to be examined, the next thing to be done is to withdraw, by the aid of a sterilised trochar, some blood from the jugular vein of a beast placed close to the spot where the microscopic examination is to take place. The dilution of the blood is done in a sterilised watch-glass, and kept, as are also the dilutant liquids, at a temperature of about 37 degrees C.

A diluted drop is then placed on the warm stage, thoroughly asepted, and a cover glass previously passed through the flame is placed on it. Then the edges are smeared with paraffin, previously heated till it produces an abundance of steam. The remainder of the dilution is placed in the incubator (étuve), while an assistant makes a dry preparation which he fixes with alcohol-ether, and which he afterwards stains for about a minute with a light methylene blue or with carbolic thionine.

This coloured preparation is examined under another microscope placed close to the one with the warm stage. Finally some pure defibrinated blood is also placed in the incubator (étuve).

Under these conditions one can follow the fresh blood for several days, and from time to time make stained preparations to determine or fix any peculiarities observed.

The examinations are all the more easy and fruitful, the richer the blood is in hæmatozoa; therefore the experimentalist should try to withdraw the blood at the favourable moment. This, again, is mainly a matter of groping in the dark, trusting somewhat to chance.

In any case, the hæmoglobin stage is the most propitious.

I was able to make a valuable choice amongst the numerous cases which were at my disposal. I especially sought for blood rich in hæmatozoa, and where the cell destruction was so intense that numerous free pyriform micro-organisms were met with in the serum.

Now, if one examines quickly a fresh preparation from an hæmogloburinic beast, one always notices intra-corpuscular hæmatozoa, and occasionally extra-corpuscular, of variable shapes and dimensions.*

Those which are free appear to revolve on their longitudinal axis, but they do not possess the true amœboid movements. A careful examination shows that this movement is determined by the violent agitation of a *flagellum*, situated on the fringed part of the pyriform hæmatozoa. This *flagellum* ends in a point. It is of about the same length as the micro-organism; does not take the blue stain, although sometimes it will take partly carbolised violet. It is this *flagellum* that so often unites two hæmatozoa, thus rendering them bigeminate.

If a pyriform hæmatozoa be carefully examined there will be perceived in its protoplasm a small brilliant point resembling a nucleus. Towards the fourth or fifth hour of observation, the pyriform hæmatozoa, free or endo-globular, will be seen to have changed its appearance. It diminishes in volume in consequence of the retraction of the protoplasm, which becomes more and more dense and more receptive of the blue stain; it ends by assuming a more or less spherical shape.

A pyriform micro-organism which measures 3 to 4 μ is only from 1 to 1½ μ when it has acquired the round shape; in this stage if the hæmatozoa are bigeminate, they remain united through the agency of the *flagellum* which bound the two points together. A curious thing is that these last contract slower than the remainder of the protoplasm, so that by the aid of the methylene blue, two little spheres furnished with a short lineal prolongation are often made apparent by staining. *All the pyriform hæmatozoa assume the rounded form*; this is, therefore, a necessary stage, and not an accidental one in the evolution of the micro-organism. *This same round form is found in the organism, especially at the instant when the disease is declining.*

In fact, if at this period an infected beast is killed, and the substance of the kidney immediately examined, the micro-organism under this round shape will be seen there, and often in quantity.

* It is absolutely necessary to make comparative examinations with fresh blood drawn from healthy animals. Failing this precaution it is possible to mistake hæmatoblasts, globulins, or granules for hæmatozoa.

In no case can the round form transform itself directly into a pyriform hæmatozoa. It is easy to follow these transformations of the micro-organism by examining after staining a little of the substance of the kidney or some of the blood from the cardiac muscle taken from an animal killed at the beginning of the hæmoglobinuric period; these corpuscles are found infested by the pyriform micro-organisms. In submitting these organs to the temperature of the laboratory in order to make repeated hourly examinations, the *Piroplasma* will be seen to become round. This transformation takes place with a certain number in three hours; with others only in eight or ten hours.

The examination of the blood without staining is very favourable at first, but afterwards the results are much less clear, for the hæmatozoa diminish in volume, become very transparent and difficult to be seen, so much so that they seem to have

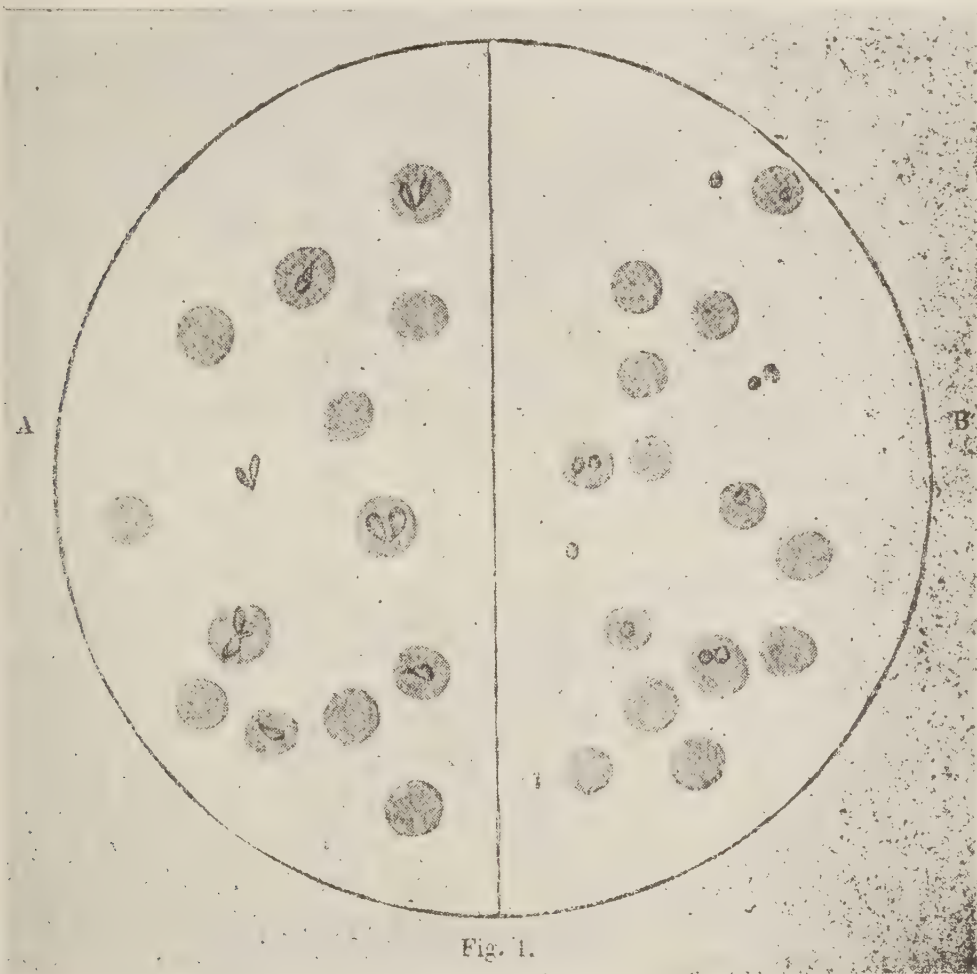


Fig. 1.

- A. Red corpuscles infected by the *Piroplasma bigeminum* in the pear form (typical).
 B. Red corpuscles infected by the *Piroplasma bigeminum* in the round form.

disappeared. This difficulty is rendered still greater by the presence of granules more or less numerous and impossible to differentiate from the hæmatozoa, agitated by a well-defined movement (described by Brown).

It is better, therefore, to have recourse to examinations after staining in order to pursue this study under favourable conditions.

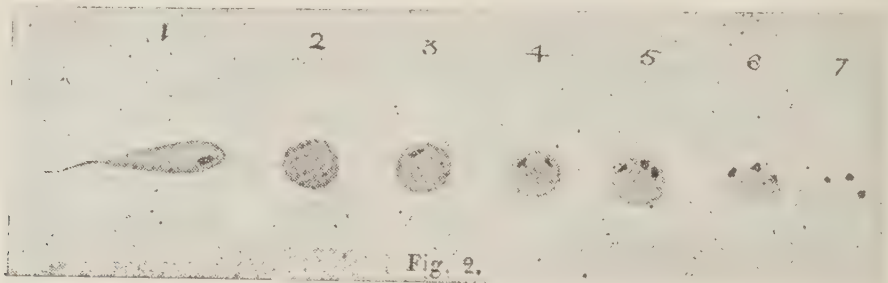
To do so, two samples of blood are required, drawn pure, and defibrinated. One of these is placed on the incubator (étuve) at a temperature of 37 degrees C., and the other is left to the temperature of the laboratory.

The repeated examination of these two samples of blood, made by the aid of stained preparations, afford information on the ulterior transformations of the micro-organism of the greatest importance, and of which a knowledge is indispensable in order thoroughly to understand the mechanism of infection and that of immunity from the "Tristeza."

We know that with the help of the excellent method highly recommended by Professor Laveran, it is easy to show in the pear-shapes, a chromatic mass which he described to Nicolle under the name of *haryokinesis*. At the moment, then, when the micro-organism takes on the round shape (second stage), this haryokinesis is usually unstained; it appears to have escaped outside the *Piroplasma*.

During the following few days, sometimes within from thirty-six to forty-eight hours, the chromatic mass reforms itself into the round micro-organism, then divides by equal scission into two, three, four, and even five small elements, many of which are of more restricted volume than any of the known colourable microbes (Third stage).

Up to the present, I have in vain tried to observe any division of the protoplasma, following the small chromatic masses to furnish new micro-organisms. I have seen, on the contrary, each of the small chromatic elements finish by becoming free, either before or especially after the more or less deliberate destruction of the protoplasma of the micro-organism, and probably after having surrounded themselves with a thin protoplasmic coating, which so far, I have had difficulty in distinguishing with nicety.



1. Pear form with a thick chromatic element and a *flagellum*.
2. Round form, recent without chromatic element.
3. 4. 5. Formation of chromatic elements or germs.
6. The germs about to escape.
7. The germs are free.

It is important to note that after they are set at liberty the small chromatic masses may still suffer division by equal scission. *I have followed and proved all these transformations in the stomach of the tick.*

To my mind, it is these little free elements which, after having been ejected from the parasite like granules, are charged with the mission of perpetuating the species. They represent also the form of resistance. This is the reason for my calling them spores or germs in default of any, perhaps, more appropriate name.

Without absolutely denying that there may be another evolution, that which I have just described is normal; it occurs also even in the organisms of diseased animals as I have proved.

We shall see by-and-by, what useful consequences may ensue from this new idea of the formation of the germs of *Piroplasma bigeminum*.

Single or bigeminate, these germs remain for some time attached to the coat of the stomach of the parasite from which they were derived, by something which can only be a small *flagellum*. To explain this union, I must admit the existence of this *flagellum* with which the germ should be furnished, although I have not succeeded in staining it.

The germs do not exhibit true movements of progression; they exhibit violent shocks, jerks, immoderate, without any defined direction. If we examine, as I have said above, the two samples of blood, we see developing in each of them the formation of germs. This is more rapid in the blood on the incubator; but in both it begins immediately the blood has left the veins, and may end in twenty-four hours.

From what I have explained, it is easy to resume the evolution of the *Piroplasma bigeminum*.

The pear-like shape which so well characterises the hæmatozoa of the "Tristeza" develops itself in the red corpuscles.

It lives at their expense, and probably especially at the expense of the hæmoglobin.

Sometimes the red corpuscles is so quickly destroyed that free pyriform hæmatozoa are found in the serum. These hæmatozoa being liberated, *are incapable of entering a new cell*; they undergo, like those which have attained their full growth in the extravasated blood, the retraction which is to restore them from the elongated to the round form.

The micro-organism then gives birth to one, two, or three germs. These become free after having passed through the coat of the stomach of the parasite; they are not round, but are slightly elongated, single or geminated, and are always furnished with a *flagellum* which is not stainable with methylene blue.

Once at liberty, these germs enter the corpuscles, when they develop once more into the pyriform micro-organism with a rapidity which is no less than that with which microbes increase.

If the germ is single, it gives birth to a unique micro-organism; it is double. This happens when two germs are united by the *flagellum*. The bigeminate micro-organism has appeared.

When there are four *Piroplasma* in a red corpuscle, it is because there has occurred simultaneous infection by two double germs. Finally, the presence of three pyriform micro-organisms in corpuscles should be due to infection by three germs united or not by their *flagellum*, or perhaps to the abnormal evolution of a germ in the corpuscle itself.*

The enormous diminution in the number of red corpuscles, ascertained in twenty-four hours (as much as 6,000,000 per cubic millimetre) implies at once an evolution and a germ formation of extraordinary rapidity, since each pyriform hæmatozoa, single or bi-geminate, can only destroy one red corpuscle.†

ARTIFICIAL CULTURES OF THE PIROPLASMA BIGEMINUM.

On the subject of blue-stained preparations, derived from a blood very rich in micro-organisms and left on the incubator for several days, I have remarked that the germs, still bound to the hæmatozoa by their *flagellum*, had not remained stationary, and that a certain number of them had grown larger. I interpreted this fact as a commencement of culture, and I made experiments to artificially assist this development.

All the attempts at culture in ordinary media—such as various broths, gelatine, gelatose, potato, serum, liquid amnion, aqueous humours, in the air, in *vacuo*, in carbonic acid, in hydrogen, in bags of collodion, with the blood or tissues of organs very rich in micro-organisms—all these have remained sterile or have only yielded ordinary microbes: *coli-bacillus*, *subtilis*, *staphylococci*, *streptococci*, *aspergillus*, *glauca*, &c.

Since the liquid blood left on the incubator appeared to me to lend itself somewhat to the development of germs, I took advantage of all well-defined cases to withdraw some blood, to defibrinate it with all the most necessary antiseptic precautions, and to then place it on the stove at 37 degrees C.

For a long time the results were insignificant. One day, however, I deposited on the stove a blood extremely rich in micro-organisms, and I was enabled to follow up the evolution of the hæmatozoa daily. I assisted in the formation of the germs, and on the tenth day I obtained an abundant culture *situated at the bottom of the tube*, in which almost all the germs had become larger, to form a round hæmatozoa, which in its turn produced new germs.

Thinking that the hæmoglobinemic (hemiglobinémique) serum of affected animals might lend itself to the culture, I prepared several tubes with a serum heavily charged with hæmoglobin; these tubes were inoculated with a quarter of a cubic centimetre taken from the bottom of the first cultures. After a fortnight the developments were apparent.

A third culture, made under the same conditions, gave me, two weeks later, a still better result.

The examination of this culture, after staining with methylene blue, is of special interest.

The hæmatozoa of various sizes, but noticeably larger than in the first culture, have all the rounded form. They seem to have taken to the medium; their productiveness is exuberant, and their appearance different to that which we have just seen in the formation of the germs.

In this third culture the hæmatozoa does not undergo the retraction of the protoplasm; in the heart of this last, one, two, three, or four germs may be seen to form; usually the number is two, which are of considerable dimensions, these also not undergoing either any retraction, and developing, on the contrary, very quickly after they have passed through the coat of the stomach of the hæmatozoa. The resulting young micro-organisms grow rapidly; they are often united two and two by a filament not susceptible to the blue stain.

* The conclusions drawn from these investigations have been sent under seal, in June, 1899, to the Central Society of Veterinary Medicine of Paris.

† Although the destruction of a certain number of corpuscles may be solely due to hæmatozoic poisoning (as in the case of *toluylene-diamine*), it is certain that the red corpuscles are specially destroyed by the hæmatozoa, since there is always a close relation between the number of endo-globular hæmatozoa and the number of cells destroyed; on the other hand, the destruction of the red corpuscles ceases just at the moment when the hæmatozoa begin to disappear from the blood.

Rapid development of the germs. True culture.



1. Round micro organism of recent formation without clear germs.
2. Round micro-organism with two germs.
3. The germs approach the coat of the stomach and develop.
4. The germs begin to grow outside to form fresh round parasites.
5. The preceding development is more pronounced; the primitive protoplasma is seen to destroy itself, it scarcely takes the stain.
6. Round micro-organisms. Return to stage 1.

A fourth culture, still obtained by the same process, proved a little less prolific, whilst the fifth was very barren. As may be seen, these cultures proceed slowly.*

ACTIVE AND PASSIVE GERMS.

In the artificial culture of the *Piroplasma bigeminum*, I have easily proved a difference between the germs produced by the first culture, which are very retracted germs, taking long to germinate, and those formed in the third culture, in which no retraction is observed, and which have the property of germinating immediately on their becoming free.

It appears, indeed, that the *Piroplasma bigeminum* is able to produce in the organism germs of slightly distinctive qualities; some which are formed rapidly in the micro-organism being slightly retracted, or even not having yet assumed the round form, others being produced more slowly and with complete retraction of the protoplasma.

The former quickly infect the red corpuscles and grow immediately; we have one proof of their existence and of their power of development in the rapidity of the cellular destruction. These germs are gifted with prodigious activity; inoculation by them produces the disease; outside the organism they quickly lose some of their properties. I call these *Active Germs*.

The others are incapable of infecting the red corpuscles without some assisting cause. On the other hand they preserve their vitality for a long time outside the organism, and represent the true form of resistance of the hæmatozoa. I will call them *Passive Germs*. These passive germs may be found in the organism at the close of the hæmoglobinuric stage, notably in the kidneys and in the urine. It is they which grow in the artificial cultures.

They exist also in ticks.

The sub-cutaneous or intravenous inoculation of these germs does not produce "Tristeza."

Do they require, in order to develop in the corpuscles, to undergo some new evolution in a foreign organism, for example, or merely to be aided by favourable circumstances? This we shall see *à propos* of the intimate action of ticks.

Whilst recognising the active and passive germs I have no intention of establishing a difference between these two types by stating that they have no affinity. I believe, on the contrary, that the active germ, in losing some of its properties, may become a passive germ. But what I wish to maintain is the possibility, in the case of the hæmatozoa, of producing germs with distinct qualities; some fragile, but capable of inflicting and immediately destroying the red corpuscles; the others resistant, but unsuited to development in the red corpuscles without the help of some favouring cause. There is a very convincing experiment from this point of view; it is the one

* Still, I have obtained more rapid developments, and never does the hæmatozoa take the pyriform appearance which appears to be exclusively endo-globular. On the other hand, and I must lay stress upon this fact, the culture in hæmoglobin serum is only possible by taking blood very rich in hæmatozoa, and more often than not, failure will result. (2) †.

† The culture of which I have just spoken does not grow in any ordinary medium; it has not the slightest pathogenic action on small animals experimented on, such as rabbits, guinea-pigs, mice, rats, birds, &c. It has nothing in common with that obtained and described by Babes.

which consists in inoculating the "Tristeza" hypodermically. Whilst the result is positive when the blood recently drawn from an animal virulently attacked, is made use of, blood which contains *Piroplasma* capable of producing active germs, it is, as we shall see, always negative if one operates with the blood of ticks or with any other matter containing only passive germs.*

FLAGELLATED CELLS.†

I must also explain the presence of the flagellated cells in the blood of animals attacked by "Tristeza." By analogy with what has been observed in human malaria, I at once concluded that these flagella had some relation to *Piroplasma bigeminum*. My observations show that they are constituted by simple prolongation of protoplasm of the cells. They are reserved in the blood recently drawn from an animal; they also are produced in great numbers on the warm stage. There is nothing easier than to assist their formation. Under the microscope one notices at first on the surface of the cells small spikelets, very short, to the number of two, three, five and even up to eight or ten. They appear to be formed of a homogeneous substance, of the same appearance as the cell protoplasm; or else they are granulated, when they resemble a small chainlet of *streptococci*. I have never succeeded in following them into the red corpuscles.

After an hour or two of observation, one notices their rapid increase and the lively undulatory movements by which they are animated. Their extremity appears to be a little distended. A few separate themselves completely from the body of the cell, and run quickly about on the field of the microscope.

They are perhaps those *flagella* which have been described and considered by Krogius, von Hellens, San Felice, and Lodavico, as prolongation of the micro-organism, analogous to the *flagellum* of the spherical bodies of Laveran's hæmatozoa.

I do not share this opinion, because I have seen these *flagella* developing under my own eyes on corpuscles free from *Piroplasma bigeminum*. I may add that they may be stained by eosin and not by methylene blue. In a future mémoire, I shall specially return to the subject of globular *flagella*.

MILD EVOLUTION OF THE "TRISTEZA." IS IT DUE TO A SPECIAL FORM OF MICRO-ORGANISM?

Smith and Kilborne have, as a matter of fact, attributed the mild form of the disease to the existence in the corpuscles, especially at their periphery, of very minute *punctiform* hæmatozoa, to the number of one, two, or three which will infect 50 per cent. of the red corpuscles. For my part I believe the scientific American authors have been deceived by their method of staining which produces occasionally a great number of interglobular granules resembling in fact, the micro-organism.

Still, it may be remarked that these granules are very irregularly distributed on the preparation; certain parts of it are covered with them, whilst from other parts they are entirely absent. If the same blood be coloured by different methods, notably by stained methylene blue only, as I have indicated, these granulations are no longer found. They therefore represent an accident of preparation. Actually the mild form, as well as the virulent form of the disease, is caused by the same micro-organism. Only, in the first case, the corpuscular infection stops quickly, and reaches only a relatively restricted number of corpuscles; in the second, on the contrary, it is rapid and general.

One of the illustrations of Smith and Kilborne's admirable book shows well that the punctiform granules have no relation whatever to the hæmatozoa.‡

By the side of a giant multinucleated cell are seen six cells or eleven carriers of these little specks, regarded by the American authors as micro-organism. Now, never is a large number of intraglobular hæmatozoa found simultaneously with giant multinucleated cells. These latter appear on the decline of the disease. Neither can these punctiform granulations be confounded with the germs of which I have spoken, as these are never observed under these conditions.

N.B.—I am indebted to Mr. W. C. Quinnell, M.R.C.V.L., of the Agricultural Department, for his valuable assistance in securing the correctness of the anglicised technical terms in the above paper.—TRANSLATOR.

* Impossible, through the direct passage of *Piroplasma* in the corpuscles, the infection can only be made through the germs.

† In order the better to show that the *flagella* of the cells do not constitute a stage in the evolution of hæmatozoa, I have been careful to describe them only after that of *Piroplasma bigeminum*.

‡ Micro-organisms within the red blood corpuscles. Fig. 3.

ON THE VALUE OF TUBERCULIN.

No. 2.

By C. J. POUND, Government Bacteriologist.

Every week, aye, almost every day, we are receiving information regarding the prevalence of tuberculosis among cattle in various parts of the world, and all this is largely due to the application of the almost infallible tuberculin test. Previous to the discovery of this substance by Robert Koch, the diagnosis of tuberculosis by clinical methods was an extremely difficult and uncertain undertaking.

Professor McFadyean, writing from the Royal Veterinary College, London, states that during the past two years, that institution prepared and supplied tuberculin for testing 4,379 cattle in various parts of England and Scotland, with the result that 1,389 or 31·7 per cent. reacted, and were found tubercular. He further points out, that with few exceptions the animals were apparently healthy.

There does not appear to be any ground for believing that if the whole of the breeding cattle of the United Kingdom were tested, the proportion of them found to be affected would be much less.

Probably some persons in reading through the home papers, may have noticed that on the 20th December, 1898, King Edward VII., the then Prince of Wales, convened a meeting at Marlborough House to further the objects of the National Association for the prevention of consumption and other forms of tuberculosis. On the occasion of that meeting, His Majesty mentioned that the late Queen Victoria had given authority to destroy thirty-six out of forty of her dairy cows at her home farm at Windsor, because on being tested with tuberculin, they were found to be tuberculous. This statement obtained wide publicity, and it has naturally excited a great deal of interest among owners of cattle and others who are specially concerned in the eradication of tuberculosis from dairy stock.

The animals tested formed the herd of unpedigreed cows kept for the supply of milk at the home farm at Windsor. These animals were under the veterinary care of Messrs. Allnutt and Tennant, Veterinary Surgeons, Windsor, and the whole of the animals were in good condition and apparently healthy. Notwithstanding this, it occurred to those responsible for the management of the herd that, in view of the accumulated evidence of the accuracy of the indications afforded by tuberculin, and the desirability of excluding from the herd every animal affected with tuberculosis, however slightly, the whole of the cows ought to be tested. Professor Sir George Brown, C.B., Chief Veterinary Advisor to the Government, when consulted, supported the view, and the test was accordingly carried out on the 15th and 16th September, 1897. The result of the testing proved that at least thirty-two of the cows were affected, while only five could be pronounced healthy, and the remaining three doubtful.

To retain the animals that had reacted in the herd was undesirable, and it was therefore decided that the whole of these should be killed and submitted to a searching *post-mortem* examination.

Subsequently, it was thought that the observations made on the reacting animals would have a greatly enhanced value, if the non-reacting animals and those in which the reaction appeared doubtful were also submitted to a careful search for evidence of the disease after death, and accordingly the whole of the cows were killed and examined at the Royal Veterinary College, within a few weeks after they had been tested.

On *post-mortem* examination it was found that thirty-six animals were affected with tubercular disease in some form, while four were perfectly free from the disease. In only one case was an erratic reaction observed in an animal free from tuberculosis, but it should be specially pointed out that this particular animal had some uterine disease, which probably disturbed its temperature after the tuberculin was injected.

The fact that such a large proportion of Her late Majesty's dairy herd had become tuberculous, illustrates a point which it is all important to keep in mind

in devising measures for the prevention and suppression of the disease. The premises in which these cows were kept are probably the best in the United Kingdom from the point of view of cubic space, light, and ventilation, and in respect to cleanliness they left nothing to be desired. Nevertheless the disease had attacked thirty-six out of forty of the animals. From this, Professor McFadyean states, it may be inferred that tuberculosis among dairy cattle cannot be successfully attacked by simply insisting upon a cubic capacity of 800 feet per animal in cowsheds. There is only one way of keeping housed cattle free from tuberculosis, and that is to see that no tuberculous animal is admitted among them. That plan has been adopted in creating a new dairy herd at the home farm at Windsor, all the animals purchased for it being tested with tuberculin, and admitted only when they did not react.

It must not for one moment be thought that, if the tubercular test is applied to a dairy herd, and all the animals that react are at once destroyed and eliminated, tuberculosis is stamped out for all time from that herd. The tuberculin test should be applied at least every six months, no matter how healthy and thrifty the animals may appear; in fact, judging from my experience with the disease, I would urge that the test be applied certainly not less than once every three months during the first year. If anyone should doubt the necessity of this I would refer him to the often-cited experiments of Professor Bang, in Denmark. Take, for example, the results of the attempts to eradicate the disease from the farm at Thurbylille. Here, the whole herd were first tested in the spring of 1892, and all the animals that reacted were removed at once to a separate division. What was the result? The eighth, ninth, and tenth tests revealed respectively seven, seven, and six cases of tuberculosis; in other words five years of this system had not sufficed to eradicate the disease from a herd where every known method was adopted that science could devise for its prevention and suppression; therefore, when we consider the firm hold that tuberculosis has upon some of our herds, it must be apparent to any common-sensed individual how extremely difficult it will be, even with the most stringent legislative measures, to eradicate tuberculosis from among the domesticated cattle of this colony.

Agricultural Patents.

PATENTS ACCEPTED.

CORRUGATED COMB-BAR AND FINGERS FOR STRIPPERS.—Class 29 (4 Figures) 5847: James Martin and Company, Limited, of Gawler, South Australia, engineers and manufacturers (Assignees of William Heithersay, of Petersburg, South Australia, machinist. "Improvements in Stripper Teeth and the Means for Holding them." Dated 15th January, 1901. (Drawings, 10s.; specification, 4s.) The comb-bar is of pressed sheet-steel, with a longitudinal semi-circular groove recessed downwards, the side flanges having the sweep of the beaters; the teeth are similarly formed in cross-section, and are attached across the upper side of the box by recessed rivets or bolts. (4 claims.)

CHECK-CONTROLLED MILK WEIGHING MACHINE.—Classes 32, 57 (10 Figures) 5583: George Arthur Hanna and Theodore Axel Swanson, of Hartington, county of Cedar, state of Nebraska, United States of America, manufacturers. "Automatic Liquid Weighers." Dated 20th July, 1900. (Drawings, 40s.; specification, 21s.) A milk vessel is suspended on a compound lever weighing machine so that a very slight downward motion trips a trigger escapement and throws the valve lever closing the inlet and opening the outlet; the delivered milk flows along a flexible tube through a wall to the customer, who has no access to the machine except by a handle which pulls the travelling weight to zero; on inserting a metal check of length proportioned to the quantity of milk to be delivered, the weight is set at a proper position; an intermediate lever of the machine has a sliding fulcrum that is set to deduct the agreed percentage for cream, waste or otherwise. (9 claims.)

General Notes.

WHEAT AT 170s. PER QUARTER.

The following interesting extract is from the *Times* of 11th February, 1801 :—"Yesterday a court of aldermen was held at Guildhall, when the price of bread was ordered to be continued the same as last week. We are assured that a sample of wheat sold on Monday, at the Corn Exchange, at £8 10s. per quarter. And we are told that individual avarice will not be satisfied without a still higher price. There was a sale of 500 barrels of American flour on Monday, which sold at 106s. and up to 110s. per barrel, which is at the rate of 156s. per sack. Many of these barrels were bought for private families ; but to such extremities are the bakers brought, that, to retain their customers, they were obliged to give this enormous price for flour to mix with their meal. The manufacture is almost totally suspended, as many thousand sacks of the statute meal are lying upon the wharfs unsold."

FINE ORANGE WINE.

Take half a chest (400) of Seville oranges, pare off the rinds, and put two-thirds of them into 6 gallons of water for 24 hours. Squeeze the oranges through a sieve into a pan, and then throw them into another 6 gallons of water ; wash them well in it with the hands, and when you have done so put in 6 gallons more of water, and leave them there until the next day. For every gallon of wine put into the cask $3\frac{1}{2}$ lb. of loaf sugar and the liquor strained clear from the rinds and pulp. Repeatedly wash these ; if more liquor should be required to fill up the cask, rather than add raw water, stir the wine daily till the sugar is completely dissolved, and allow it to ferment for about 5 weeks. Add three bottles of brandy, stop down, and, after 12 months, bottle.—*Farm, Field, and Fireside.*

MANURE FOR TOBACCO.

Where wattle ashes can be procured, they are said to form an excellent manure for tobacco. Mr. J. M. Van Leenhoff, tobacco expert in Natal, states that they may be used for procuring a mild, good-burning tobacco. The ashes should be ploughed in very shallow, four or five months before planting.

DISTRICT SHOW, MOUNT MORGAN.

The next show of the Mount Morgan Agricultural, Pastoral, and Poultry Society is announced to take place on the 16th and 17th August. The committee have always worked hard to render this show attractive to exhibitors and to the general public, and on this occasion also they offer a most enjoyable programme. Nearly £300 will be given away in prize money, and neither time, trouble, or expense has been spared by the Society to render the forthcoming show one of the most successful yet held in the Central district. We note that the previous secretary, Mr. T. W. Walker, has retired, and that onerous position has been filled by the appointment of Mr. J. S. Lyle.

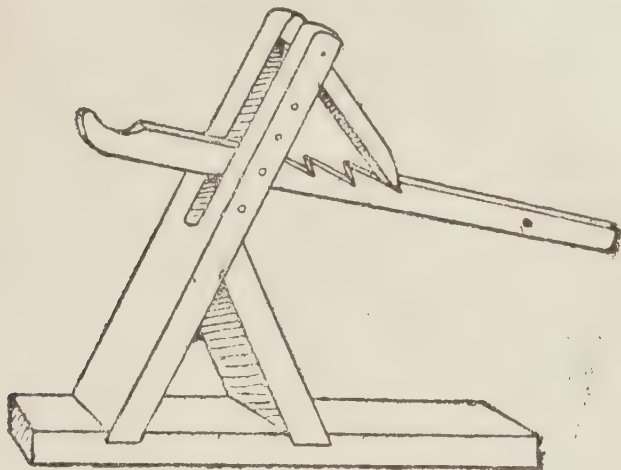
We trust that the Fates which rule the winds and rains will prove propitious, and that the Society's exertions will be rewarded by King's weather.

REMOVING WARTS FROM COWS AND HORSES.

Make a mixture of castor oil and salt. Rub the warts well with this every two days. Keep on until the warts disappear. There will be no pain or soreness.

A HANDY WAGON-JACK.

An examination of the accompanying diagram will explain far better than words can express the manner in which this useful contrivance is put together. It is simple, inexpensive, and convenient, and, constructed out of 2 inches by 4 inches boards, may be adjusted to almost any vehicle. On farm premises, where wagon-jacks are so necessary, anyone possessing the slightest knowledge of



carpentry could make such a jack in an hour or so with the assistance of a saw, a chisel, an awl, and a couple of metal rods with bolts to serve as hinges for the lever and clamp to act upon. In the rough, the jack is useful, but with the application of the plane a more presentable job is the result, and a coat of paint will tend to improve and at the same time preserve it.

TO PRESERVE YOUNG LIMES.

Millions of limes go to waste every year in this island, which with very little trouble and slight cost could be made into a delicious and very saleable preserve. The following method of preserving young limes will be found useful:—Use limes not over $\frac{3}{4}$ inches in diameter. Prepare brine by dissolving salt in water until an egg will float, in which place the limes for from ten to fourteen days; then cut these in halves and scoop out the pulp; boil the skins in two or more waters until the salt and essential oil are removed; stew them in syrup made from white granulated sugar. If crystallised limes are required, after they are stewed dry them and dip them several times in thick syrup, drying them after each dipping.—*Journal of the Jamaica Agricultural Society.*

THE LATE QUEEN'S FARMS.

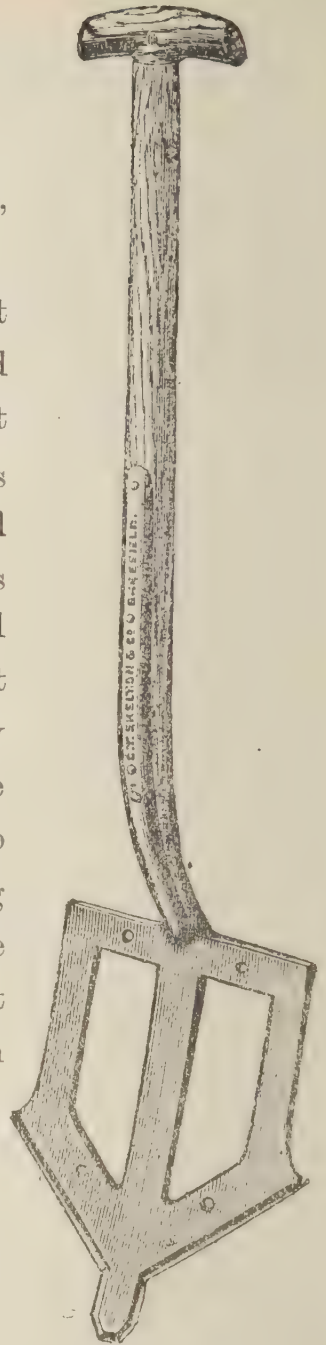
The late Queen's large farms at Windsor, which were established by the Prince Consort, are to be kept on (says the *Agricultural Gazette*, London) by the King, who has for many years maintained an extensive home farm at Sandringham. The Queen bequeathed her famous herds of pedigree cattle—Devons, Shorthorns, Herefords, and Jerseys—to the King, besides the other stock on the Shaw and Flemish Farms. The Queen had for many years past been a large prizewinner at the leading shows, and the Royal herds of pure-bred cattle are among the finest in the world. There is a large home farm at Osborne, and the stock there has been left by the Queen to Princess Henry of Battenberg.

BRISBANE WOOL SALES.

The attendance of buyers at the May wool sales was fairly good, but the general public did not appear to take the usual interest in the sales, not many outsiders being present. There was very animated competition amongst buyers for some of the lots offered, whilst others were in less demand. Generally speaking, prices ranged 10 per cent. higher than at the previous sale.

COMBINED DIGGING SPADE, POTATO FORK, AND SUBSOILER.

An implement has just been put in the British market which would probably be found very useful by market and amateur gardeners. We are not aware whether it has yet made its appearance in Australia. It is called Phillips's Digging Spade, Potato Fork, and Subsoiler, which is claimed to be three perfect implements in combination. It is extremely light, being only one-third the weight of the old shovel blade; and in the hands of an expert workman it will dig from two to three times as much ground in a day as can be moved by an ordinary spade, without causing the workman to feel the slightest strain. Used as a potato digger, there is not so much danger of it sticking or bruising the tubers, and it perfectly subsoils the ground. Double digging in light soils is unnecessary, as a depth of 1 foot 6 inches can be easily reached with this implement with only a trifle of additional labour.



PRESERVING EGGS.

The *Illustrated Landwirth Zeitung* has the following:—"Take new laid eggs, as new as possible; free them from all impurity with a damp linen cloth, taking care afterward to see that they are rubbed thoroughly dry. Then pour a few drops of boiled linseed oil into the palm of the hand, and coat each egg well over therewith, so that the oil gets into every pore of the shell, and lay on a clean shelf, well protected from the dust, to dry. On the third day a fine skin will have formed over the egg, which is then in a manner hermetically sealed up, and ready to pack away in a cool place in the usual way. Care must be taken not to employ either too much or too little oil. In the first case the oil takes long to dry, and when packed away the egg is apt to stick, and so runs in danger of getting broken when being had up for use; in the second case, the egg, of course, is not properly protected, and is sure to become stale. A little practice, however, soon enables anyone to find out the happy medium."

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may be decided on.

Answers to Correspondents.

SALT FOR FOWLS.

BANTAM, Rosalie.—Yes, salt is very good for poultry. It saves them from many diseases—such as roup, colds, and worms in the gizzard. It aids their digestion, and keeps their system in good order. Sprinkle a tablespoonful of salt over 8 or 10 quarts of wheat. Pour boiling water over the food as much as the wheat will absorb. Stir the mass well.

BORDEAUX MIXTURE.

POMONA, North Coast line.—Bordeaux mixture is a compound of sulphate of copper and lime.

It is a fungicide, and of little use by itself as an insecticide.

For winter strength, use 6 lb. bluestone, 4 lb. unslacked lime, 22 gallons water.

For summer strength—6 lb. bluestone, 4 lb. unslacked lime, 40 gallons water.

Prepare as follows (for the 40 gallons solution, the 22 gallons solution in proportion) :—

- (1.) Dissolve 6 lb. of bluestone in 20 gallons of cold water in one cask, by placing it in a bag and suspending it in the water.
- (2.) Slack 4 lb. of unslacked lime in another cask slowly, by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream free from lumps. Water should now be added, stirring well till there are 20 gallons of milk of lime in the cask.
- (3.) Stir up the milk of lime well, strain it, and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask; stir well for three minutes when, if properly made, the mixture is fit for use.

In order to see if the mixture is properly made plunge the blade of a knife into it for a minute. If the knife is untarnished, the mixture is all right; but if the knife is stained a coppery colour, then more milk of lime must be added. The mixture should always be neutral.

CHROME TANNING.

DARLING DOWNS FARMER.—Tanning or tawing by means of chromium compounds was patented by Dr. Heinzerling, a German chemist. It consists in the use of bichromate of potash, chloride of potassium or of sodium, and sulphate of alumina. These are mixed together in a large tank, from which is drawn, by piping connected with each tan pit, the quantity to make the necessary strength of the liquor. As in bark-tanning, the liquor is made weak at first, and strengthened every few days according to the thickness of the hide to be tanned. The quantity of chromic acid used generally amounts to from about $2\frac{1}{2}$ to 5 per cent. of the weight of leather produced. The price of bichrome being from 1s. to 1s. 6d. per lb., 100 lb. weight of leather would cost for this agent from 2s. to 6s. Light skins, such as sheep and calf skins, are tanned in less than a week, bullock hides in a fortnight. After being tanned the hides, which are now of a yellowish colour, are dipped in chloride of barium. The hides may be coloured like ordinary leather. When coloured the leather is allowed to get nearly dry, when it is immersed in pure paraffin wax and resin dissolved in certain proportions. The hides are then dried and brushed clean. One advantage of this process is that sheepskins do not require, as in the bark process, to be freed from fatty constituents. When finished they are quite waterproof.

CARE OF DINGO SKINS.

BUSHMAN, Dalby.—If the skins have become hard, it shows that they have been badly dressed. A good plan to soften them is to thoroughly wet the hair side with benzoline, cover it with carbonate of magnesia, and when that side is dry, rub out the caked magnesia and beat the skin on the back till it is free of the materials.

SHROPSHIRE RAM.

T. BLACK, Minnie Vale, says :—

1. I have a magnificent ram, Southdown or Shropshire, black faced, and two of the same breed of ewes. What would you advise me to do with these? I am putting the ram to dense-woolled merinoes, and I fancied getting a Lincoln ram to build their frame for mutton sheep.

The young Shropshire lambs are awfully big-framed sheep, and as large as merinoes when four months old. But the wool gets stronger and stronger—nearly all hair. What am I to do?

Answer 1.—Your ram is evidently a Shropshire Down sheep. The first cross between this breed and merino ewes makes the best of mutton, preferred to most other crosses of freezers, and the lambs of this cross are superior to any others. Would strongly recommend that the Lincoln element do not enter into the cross. Wool is a secondary consideration in the breeding of purely mutton sheep.

2. I have a dense-woolled merino ram here two years or more with goats, and he will not go with sheep at any price, and there is no sign of his cross with any of the goats. How can I account for it?

Answer 2.—This is quite beyond our experience.

The Markets.

AVERAGE TOP PRICES FOR APRIL.

Article.								APRIL.		
								Top Prices.		
								£	s.	d.
Bacon	...	...	...	...	...	...	lb.	0	0	8
Bran	...	...	...	...	...	...	ton	4	16	8
Butter, First	...	...	...	...	...	...	lb.	0	0	8 $\frac{1}{3}$
Butter, Second	...	...	...	...	...	...	"	0	0	6 $\frac{2}{3}$
Chaff, Mixed	...	...	...	...	...	...	ton	4	13	4
Chaff, Oaten	...	...	...	...	...	...	"	5	5	0
Chaff, Lucerne	...	...	...	...	...	...	"	4	13	4
Chaff, Wheaten	...	...	...	...	...	...	"	4	0	0
Cheese	...	...	...	...	...	...	lb.	0	0	8
Flour	...	...	...	...	...	...	ton	7	10	0
Hay, Oaten	...	...	...	...	...	...	"	4	0	0
Hay, Lucerne	...	...	...	...	...	...	"	3	0	0
Honey	...	...	...	...	...	...	lb.	0	0	1 $\frac{3}{4}$
Rice, Japan (Bond)	...	...	...	...	...	...	ton	14	9	2
Maize	...	...	...	...	...	...	bush.	0	3	6
Oats	...	...	...	...	...	...	"	0	3	3
Pollard	...	...	...	...	...	...	ton	4	16	8
Potatoes	...	...	...	...	...	...	"	6	3	4
Potatoes, Sweet	...	...	...	...	...	...	"	2	3	4
Pumpkins	...	...	...	...	...	...	"	1	13	4
Sugar, White	...	...	...	...	...	...	"	16	6	8
Sugar, Yellow	...	...	...	...	...	...	"	15	10	0
Sugar, Ration	...	...	...	...	...	...	"	12	3	4
Wheat	...	...	...	...	...	...	bush.	0	3	1 $\frac{1}{2}$
Onions	...	...	...	...	...	...	cwt.	0	8	6
Hams	...	...	...	...	...	...	lb.	0	0	9
Eggs	...	...	...	...	...	...	doz.	0	1	5 $\frac{1}{6}$
Fowls	...	...	...	...	...	...	pair	0	3	8
Geese	...	...	...	...	...	...	"	0	4	6
Ducks, English	...	...	...	...	...	...	"	0	3	6
Ducks, Muscovy	...	...	...	...	...	...	"	0	4	9
Turkeys, Hens	...	...	...	...	...	...	"	0	6	4
Turkeys, Gobblers	...	...	...	...	...	...	"	0	11	4

ENOGGERA SALES.

Article.								APRIL.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	8	3	4
Cows	...	...	...	...	...	...	...	7	0	10
Wethers, Merino	...	...	...	...	...	...	...	0	16	3
Ewes, Merino	...	...	...	...	...	...	...	0	13	3
Wethers, C.B.	...	...	...	...	...	...	...	0	16	10
Ewes, C.B.	...	...	...	...	...	...	...	0	16	3
Lambs	...	...	...	...	...	...	...	0	13	0
Baconers	...	...	...	...	...	...	...	2	16	0
Porkers	...	...	...	...	...	...	...	1	5	9
Slips	...	...	...	...	...	...	...	0	8	1 $\frac{1}{2}$

Orchard Notes for June.

By ALBERT H. BENSON.

The marketing of citrus fruits is still one of the principal operations in many orchards throughout the State, and the remarks ament this matter that have appeared in these notes for the past two months should be borne in mind and acted upon, as, no matter what the quality of the fruit may be, it always sells best when well packed and attractively got up, as the better it looks the better it sells.

I cannot lay too great stress on the extreme importance of handling the fruit carefully and of sweating it prior to shipment. The common practice of pulling the fruit from the tree and packing and shipping it straight away is responsible for a very large proportion of the loss so commonly met with in marketing the fruit early in the season. The skin in the earlier stages of ripening is rigid and full of moisture, so that it is easily bruised, the cells of the skin being ruptured. Fungus growths of various kinds attack the injured skin, with the result that the fruit soon becomes completely rotten, and is covered with a mass of greenish or bluish mould. This loss can be reduced to a minimum by cutting the fruit instead of pulling it, and by handling it like eggs instead of like road metal. In addition to the ordinary loss on the fruit by bad handling a further loss takes place when it is found necessary to cyanide the fruit, as, for example, when it has to be shipped to the Southern States, as the gas at once finds out every bruise, case-mark, or injury to the skin, such as plugging—viz., pulling the stem out—and turns the same black, thereby greatly detracting from the value of the fruit.

In many parts of the State deciduous fruit trees should be pruned during the month, and I strongly advise fruitgrowers to read my remarks on this subject which appeared in a previous issue of this *Journal*, as thorough pruning is seldom carried out, many trees being allowed to grow of their own sweet will without let or hindrance. This neglect to properly prune fruit trees is conducive to the rapid spread of many insect and fungus diseases, as when trees are allowed to grow into a dense bush it is impossible to keep them clean by means of any of the ordinary methods adopted for the eradication of disease, such as spraying, &c.; and when they are allowed to straggle all over the place the straggling limbs are very apt to become more or less diseased.

Old neglected trees of good varieties, and of which the roots are still healthy, should be cut hard back, and all dead, broken, or badly diseased branches should be cut off and a new head be allowed to form; but where such trees only produce inferior fruit that is of no commercial value, they should be either destroyed, or, if wished, they may be grafted on next spring with good valuable varieties. Old neglected trees are the breeding-grounds of many diseases, and when they are of no value whatever they should be destroyed, as they are a menace and source of infection to the neighbourhood in which they are growing.

Do not be afraid to prune too heavily, as it is better to lose a crop and thereby get your tree or trees into a healthy state than to leave them in an unhealthy and unpruned condition and get a poor crop of inferior fruit. Prune hard, and gather up and burn all prunings; do not let them lie about, but burn them up, as by doing so any diseases that may be on the wood that has been pruned off will be destroyed. Where trees are hard cut back and only the main limbs are left, it is advisable to follow up this same pruning with a dressing that will destroy all insects or fungus pests still remaining on the tree, and for this purpose the best remedy is to paint the stems and branches with the following mixture, prepared thus:—Boil 2 lb. of sulphur and 1 lb. of quicklime in 2 gallons of water for about one hour, then add fine clay to the mixture till it is as thick as paint, and apply with a brush. Fine flour can be used in the place of the clay if desired, and will render the mixture more lasting.

Where San José, Greedy, Mussel, or Parlataria Scales are present, this method of treatment is the most efficacious, and is even better than spraying with the sulphur, lime, and salt wash mentioned in my pamphlet on spraying. This mixture is also of value for painting the stems and main branches of citrus trees covered with mosses or lichens, or attacked by White, Red, Circular Black, Mussel, or other scale insects.

Where the ground is ready, plant deciduous trees this month; do not plant too deep, and cut back hard at planting. Clean up the orchard thoroughly, and plough and leave the ground rough as soon as the trees are pruned and the prunings are burnt. Gather up and destroy all fly-infested fruit of all kinds, as the more thoroughly the fly is kept down during the winter on the coast, the fewer flies there will be to deal with in spring. Where not already done, see that pineapples are protected from frost, and keep the ground between the plants well worked in order to retain moisture, as the winter months are usually dry and the plants are liable to injury through drought. The same remarks apply to bananas, and the unripe bunches of fruit should be protected from slight frosts or cold spells by any suitable available material.

Farm and Garden Notes for July.

FARM.—The principal field operations during this month will consist in preparing the land for maize, potatoes, sugar-cane. This is the best month for sowing lucerne, for which the land should have been already got ready. Depth of soil is essential for this crop. We have frequently given directions for the cultivation of lucerne; it is therefore needless to repeat them here. Oats, barley, and vetches may be sown, and in very early districts towards the end of the month, potatoes, maize, and sugar-cane, but in localities subject to heavy and late frosts, it is advisable to wait until there is little risk of the young plants being nipped. In the North, rice may now be sown. The coffee crop should all be harvested by this time. Cinnamon and kola-nut cuttings may be planted under glass in tropical Queensland. Yams and turmeric may be unearthed, and New Guinea tobacco be gathered. Prairie and other grasses may still be sown. We advise coffee-planters to carefully read the nine excellent articles on "Coffee Culture," by Mr. Harold Newport, Instructor in Coffee Culture, which have appeared monthly in this *Journal*.

KITCHEN GARDEN.—Make successional sowings of carrots, parsnips, broad-beans, lettuce, and other salads, peas, turnips, beet, leeks, cauliflower, spinach, &c. Plant out onions as quickly as possible. If sown in beds, there is great danger of their being smothered by winter weeds; therefore plant out as soon as they are ready. Asparagus and rhubarb may be planted out. Plenty of watering and hoeing will probably be required during this month, when dry westerly winds may be experienced; but should showery weather prevail, do not attempt to sow seeds, as the land will be liable to clog and hence be injurious to the young plants as they come up. In this case the soil should not be worked until fine weather has lasted sufficiently long to make it friable. Never walk over the beds during wet weather for the purpose of sowing, as the soil thus trodden on will cake and harden and good results cannot reasonably be expected. Non-attention to such little matters gives rise to unpleasant reflections on the seedsmen. Keep the land in good tilth by a liberal use of fork and hoe in suitable weather. Pinch back the tops of broad beans which are in flower, and stake up peas which require support. Get the ground ready for potatoes, which may be sown towards the end of the month. In warm, sheltered gardens, where frost is not to be feared, it will be quite safe to sow cucumbers, marrows, melons, &c., at the end of the month. Get the ground ready for French beans and spring crops. If you have any vacant land, dig or plough it up and leave it in a rough state until required. If it be harrowed down and pulverised too long before being planted, a growth of weeds is encouraged and the soil is deprived to a great extent of the sweetening influences of sun, rain, and air.

FLOWER GARDEN.—The winter work should now be well advanced. Thin out where plants are over-crowded, and fill up all blanks. There is plenty of work to be done in these directions. Turf and top-dress lawns. Roses may still be planted. Sow annuals, everlastings, nasturtium, larkspur, dianthus, pansies, snapdragon, cosmos, cornflower, asters, candytuft, sweet alyssum, petunia, chrysanthemum, coreopsis, &c.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

			£	s.	d.
Full page, per issue	...	...	4	0	0
Half page, per issue	...	...	2	10	0
Quarter page, per issue	...	...	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	Feb.
Ayr	Lower Burdekin Farmers' Association	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Hoiliday	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin	13 and 14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon	
Blackall	Barcoo Pastoral Society	F. Clewett	
Boonah	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean	14 and 15 June
Bowen	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer	
Bowen	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen	Proserpine Farmers and Settlers' Association	Joseph Cooper	
Booyal	Booyal Farmers' Progress Association	Thos. Skillington	
Brisbane	Horticultural Society of Queensland	J. F. Bailey	April
Brisbane	Queensland Acclimatisation Society	E. Grimley	
Brisbane	National Agricultural and Industrial Association of Queensland	H. C. Wood	
Brisbane	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley	
Brisbane	Queensland Stockbreeders and Graziers' Association	F. A. Blackman	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ...	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambleton Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association	J. Harvey ...	27 and 28 Dec., 1900
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Glenlyon ...	Afton Downs Farmers' Association	L. J. Landsberg ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid ...	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association... ..	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary,	Date of Show.
Herbert River Herberton ...	Ripple Creek Farmers' Association ... Mining, Pastoral, and Agricultural Association	J. W. Grimes ... John M. Hollway ...	3 and 4 April
Hodgson ... Hughenden...	Hodgson Farmers' Association ... Hughenden Pastoral and Agricultural Association	C. W. Nimmo ... H. P. Blackall ...	7 and 8 May
Ingham ... Ingham ...	Herbert River Farmers' Association ... Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochran ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ... Laidley ...	Mungore Farmers' Association ... Lockyer Agricultural and Industrial Society (Ploughing Match, Laidley)	I. M. Robinson ... John Fielding ...	11 Oct.
Loganholme... Longreach ...	Logan Farming and Industrial Association ... Longreach Pastoral and Agricultural Society	F. W. Peek ... J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ... Mackay ...	Agricultural, Pastoral, and Mining Association Pioneer River Farmers' Association ...	F. Black ... E. Swayne ...	28 and 29 June
Mackay ... Mapleton, <i>via</i> Nambour	The Mackay and District Horticultural Society Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	Fred. Bourne ... W. J. Smith ...	
Maryborough Maryborough Maryborough Maryborough	Dairymen's Association ... Maryborough Horticultural Society ... The Island Farmers' Progress Association ... Wide Bay and Burnett Pastoral and Agricultural Society	G. E. Henty ... H. A. Jones ... C. A. Schmidt ... G. Willey ...	4, 5, and 6 July
Miallo ... Miara, Yandaran	Miallo Progress Association ... Avondale Farmers and Planters' Association	E. F. Welchman ... F. E. Eggar ...	
Milbong ... Mitchell ...	Milbong Farmers' Association ... Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	T. R. Garrick ... H. J. Corbett ...	
Mosman River Mount Cotton	Mosman River Farmers' Association ... Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	Geo. W. Muntz ... F. N. Sharman ...	
Mount Mee... Mount Morgan	Mount Mee Farmers' Association ... Mount Morgan Agricultural, Pastoral, and Poultry Society	R. Thomas ... Thos. W. Walker ...	
Nambour ... Nambour ...	The Rosemount Association ... The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	George Etheridge ... J. R. Isgar ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ... North Pine ...	North Isis Canegrowers' Association ... Moreton Agricultural, Horticultural, and Industrial Association	W. J. Young ... J. Duffield ..	
Palmwood* ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	
Pialba ... Pinbarren ...	Pialba Farmers' Association ... Pinbarren Agricultural and Progress Association	J. B. Stephens ... H. Armitage, senr. ...	
Port Douglas Razorback ... Rockhampton	Pastoral, Agricultural, and Mining Association The Razorback Fruitgrowers' Association ... Central Queensland Farmers and Selectors' Association	W. H. Dorrat ... Robert Tinning ... T. Whitely, Coowonga	2 Aug.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

* SHOW DAY.—Thursday previous to the Exhibition of the Queensland National, Agricultural, and Industrial Association, Brisbane.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ..	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	22 and 23 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	16 and 17 Jan., 1901
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	31 Jan. & 1 Feb.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the

Under Secretary for Agriculture, Brisbane,

or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	
Or estimation of lime, potash, phosphoric acid, nitrogen ...	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes... ..	3	3	0

SCALE OF FEES—*continued*.

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c. Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	
Sand	0	5	0
Nitrogen	0	7	
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample	0	15	0
Milk, butter, cheese—Complete commercial analysis... ..	1	1	0
Tanning materials— Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	3	0	

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, ETC.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,

Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honey-suckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.

3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

ALL communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, H. C. Quodling; Biggenden State Farm, Biggenden, manager, Henry A. Tardent; Hermitage State Farm, Warwick, manager, C. Ross; Gindie State Farm, manager, R. Jarrott; Redland Bay Experiment Orchard, manager, J. Henderson; Kamerunga State Nursery, Cairns, overseer, G. B. Brooks.

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QUEENSLAND FLORA.

BY
F. MANSON BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

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Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates :—

Full page, per issue	...	...	...	£	s.	d.
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				1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton...	6 Feb.
Ayr ...	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	11 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	Charles H. Peppin ...	13 and 14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society ...	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer ...	
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith ...	9 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland ..	J. F. Bailey ...	April
Brisbane ...	Queensland Acclimatisation Society ...	E. Grimley ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis ...	
Bundaberg ...	Woonzarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ...	
Cairns ...	Alloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association	H. Epps ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodlife ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil	Dallarnil Farmers' Association	W. E. Burton ...	
Scrub, <i>via</i> Degilbo			
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association	J. Harvey ...	27 and 28 Dec., 1900
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Glenlyon ...	Afton Downs Farmers' Association	L. J. Landsberg ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid ...	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association... ..	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River Herberton ...	Ripple Creek Farmers' Association ... Mining, Pastoral, and Agricultural Association	J. W. Grimes ... John M. Hollway ...	3 and 4 April
Hodgson ... Hughenden...	Hodgson Farmers' Association ... Hughenden Pastoral and Agricultural Association	C. W. Nimmo ... H. P. Blackall ...	7 and 8 May
Ingham ... Ingham ...	Herbert River Farmers' Association ... Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ... Laidley ...	Mungore Farmers' Association ... Lockyer Agricultural and Industrial Society (Ploughing Match, Laidley)	I. M. Robinson ... John Fielding ...	11 Oct.
Loganholme... Longreach ...	Logan Farming and Industrial Association ... Longreach Pastoral and Agricultural Society	F. W. Peek ... J. P. Peterson ...	17 and 18 April
Lucinda Point Mackay ... Mackay ...	Victoria Farmers' Association ... Agricultural, Pastoral, and Mining Association Pioneer River Farmers' Association ...	W. S. C. Warren ... F. Black ... E. Swayne ...	28 and 29 June
Mackay ... Mapleton, <i>via</i> Nambour	The Mackay and District Horticultural Society Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	Fred. Bourne ... W. J. Smith ...	
Maryborough Maryborough Maryborough Maryborough	Dairymen's Association ... Maryborough Horticultural Society ... The Island Farmers' Progress Association ... Wide Bay and Burnett Pastoral and Agricultural Society	G. E. Henty ... H. A. Jones ... C. A. Schmidt ... G. Willey ...	4, 5, and 6 July
Miallo ... Miara, Yandaran	Miallo Progress Association ... Avondale Farmers and Planters' Association	E. F. Welchman ... F. E. Eggar ...	
Milbong ... Mitchell ...	Milbong Farmers' Association ... Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	T. R. Garrick ... H. J. Corbett ...	
Mosman River Mount Cotton	Mosman River Farmers' Association ... Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	Geo. W. Muntz ... F. N. Sharman ...	
Mount Mee... Mount Morgan	Mount Mee Farmers' Association ... Mount Morgan Agricultural, Pastoral, and Poultry Society	R. Thomas ... Thos. W. Walker ...	
Nambour ... Nambour ...	The Rosemount Association ... The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	George Etheridge ... J. R. Isgar ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ... North Pine ...	North Isis Canegrowers' Association ... Moreton Agricultural, Horticultural, and Industrial Association	W. J. Young ... J. Duffield ..	
Palmwood* ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	
Palmwoods ...	Palmwoods Industrial Fruitgrowers and Farmers' Progress Association	Frank Shurvell ...	
Pialba ... Pinbarren ...	Pialba Farmers' Association ... Pinbarren Agricultural and Progress Association	J. B. Stephens ... H. Armitage, senr. ...	
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association		
Port Douglas Razorback ... Rockhampton	Pastoral, Agricultural, and Mining Association The Razorback Fruitgrowers' Association ... Central Queensland Farmers and Selectors' Association	W. H. Dorrat ... Robert Tinning ... T. Whitely, Coowonga	2 Aug.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

* SHOW DAY.—Thursday previous to the Exhibition of the Queensland National, Agricultural, and Industrial Association, Brisbane.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ..	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	7 and 8 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	23 and 24 Jan.
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes... ..	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	30 and 31 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the

Under Secretary for Agriculture, Brisbane,

or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	0
Or estimation of lime, potash, phosphoric acid, nitrogen ...	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes... ..	3	3	0

SCALE OF FEES—*continued*.

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c.			
Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	0
Sand	0	5	0
Nitrogen	0	7	6
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample	0	15	0
Milk, butter, cheese—Complete commercial analysis... ..	1	1	0
Tanning materials—Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	3	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, Etc.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,

Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.

3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

ALL communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, H. C. Quodling; Biggenden State Farm, Biggenden, manager, Henry A. Tardent; Hermitage State Farm, Warwick, manager, C. Ross; Gindie State Farm, manager, R. Jarrott; Redland Bay Experiment Orchard, manager, J. Henderson; Kamerunga State Nursery, Cairns, overseer, G. B. Brooks.

PUBLIC ANNOUNCEMENT.

The Curator of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

THE CURATOR, BOTANIC GARDENS, BRISBANE,

and freight will be settled on delivery in Brisbane.

PLANT FOR DRY COUNTRY.

The Curator of the Botanic Gardens announces that he has for distribution seeds of a species of melon which is found in the arid region of South Africa known as the Kalihara Desert, and which renders existence and travel possible in that waterless country. He will be glad to send seeds to any person who will deposit them in sandy and waterless districts in Queensland.

The Hon. F. R. Moor, of the Natal House of Assembly and a member of the Natal Government, now visiting Brisbane, states that this melon is the greatest boon which can be bestowed on an arid region.

NOTICE.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of SIXPENCE to cover cost.

THE
QUEENSLAND FLORA.

BY
F. MANSON BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 and 400 PAGES EACH, ROYAL OCTAVO.

PRICE, 5s. PER PART.

THE WORK IS NOW GOING THROUGH THE PRESS, AND PARTS

1 AND 2 ARE NOW FOR SALE BY

MESSRS. GORDON AND GOTCH,

QUEEN STREET.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	6 Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	31 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	7 Sept.
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	13 and 14 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer ...	
Bowen ...	Pastoral, Agricultural, and Mining Association	J. E. Smith ...	9 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland ..	J. F. Bailey ...	30 April and 1 May
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture ...	R. G. Curtis ...	
Bundaberg ...	Woonzarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association ...	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Duffey ...	
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet ...	
Cairns ...	Alloombah Farmers' Association ...	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association ...	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	Alan B. Bright ...	30 and 31 May; 1 June
Childers ...	Isis Agricultural Association ...	H. Epps ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association ...	B. Goodlife ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association ...	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers' Association ...	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association ...	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	J. Harvey ...	27 and 28 Dec.
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid ...	
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...	19 and 20 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League ...	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	3 and 4 April
Herberton ...	Mining, Pastoral, and Agricultural Associa- tion	John M. Holloway ...	
Hodgson ...	Hodgson Farmers' Association	C. W. Nimmo ...	7 and 8 May
Hughenden ...	Hughenden Pastoral and Agricultural Asso- ciation	H. P. Blackall ...	
Ingham ...	Herbert River Farmers' Association	P. J. Cochrane ...	Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	24 and 25 July
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ...	Mungore Farmers' Association	I. M. Robinson ...	17 and 18 April
Laidley ...	Lockyer Agricultural and Industrial Society (Annual Show, Laidley)	John Fielding ...	
Loganholme ...	Logan Farming and Industrial Association ...	F. W. Peek ...	28 and 29 June
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	10, 11, and 12 July
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...	
Mackay ...	Pioneer River Farmers' Association	E. Swayne ...	9 April
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne ...	
Mapleton, <i>via</i> Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith ...	5 Oct.
Maryborough	Dairymen's Association	G. E. Henty ...	
Maryborough	Maryborough Horticultural Society	H. A. Jones ...	2 Aug.
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricul- tural Society	G. Willey ...	2 Aug.
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar ...	2 Aug.
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	2 Aug.
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruit- growers and Farmers' Association	F. N. Sharman ...	2 Aug.
Mount Mee ...	Mount Mee Farmers' Association	R. Thomas ...	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	2 Aug.
Nambour ...	The Rosemount Association	George Etheridge ...	
Nambour ...	The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	J. R. Isgar ...	2 Aug.
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	2 Aug.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
North Pine ...	Moreton Agricultural, Horticultural, and In- dustrial Association	J. Duffield ..	2 Aug.
Palmwoods ...	Palmwoods Industrial Fruitgrowers and Farmers' Progress Association	Frank Shurvell ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	2 Aug.
Pinbarren ...	Pinbarren Agricultural and Progress Asso- ciation	H. Armitage, senr. ...	
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horti- cultural Association	W. H. Dorrat ...	2 Aug.
Port Douglas	Pastoral, Agricultural, and Mining Association		
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	2 Aug.
Rockhampton	Alton Downs Farmers' Association	L. J. Landsberg ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	2 Aug.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ..	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	7 and 8 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	23 and 24 Jan.
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burttt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	6 and 7 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	30 and 31 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	13 June
Woodford ...	Woodford Progressive Industrial Association	E. Heaton	
Woombye* ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	C. M. F. Fischer ...	20 Jan.

* SHOW DAY.—Thursday previous to the Exhibition of the Queensland National, Agricultural, and Industrial Association, Brisbane.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the
Under Secretary for Agriculture, Brisbane,
or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	0
Or estimation of lime, potash, phosphoric acid, nitrogen ...	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes...	3	3	0

SCALE OF FEES—*continued.*

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c. Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	0
Sand	0	5	0
Nitrogen	0	7	6
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample	0	15	0
Milk, butter, cheese—Complete commercial analysis... ..	1	1	0
Tanning materials— Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	3	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not; ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, ETC.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maize sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,

Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.

3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,

Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,

JOHN L. FEGAN.

GOD SAVE THE QUEEN!

Department of Agriculture,

Brisbane, 28th January, 1901.

BURSARIES, QUEENSLAND AGRICULTURAL COLLEGE.

An Examination will be held on the 27th June next, in Brisbane and elsewhere, as may be decided upon, according to the localities where the candidates reside, for four Bursaries at the Queensland Agricultural College. These entitle the holders to free board and instruction as resident students, and are tenable during good behaviour and the pleasure of Parliament for a period of three years. Candidates must not be less than fourteen or more than sixteen years of age on the 30th June, 1901.

Application for examination must reach the Under Secretary for Agriculture, Brisbane, not later than the 17th May next, and must be accompanied by (1) a certificate of birth; (2) proof that the applicant has resided for two years in Queensland, or that his parents have resided there for three years preceding the Examination—this certificate to be attested by a magistrate; (3) a medical certificate that he is of sound constitution and in good health.

The Examination will cover the following subjects:—Writing, arithmetic, English composition, geography, and the elements of agriculture. Candidates not obtaining at least fifty per centum of marks in the elements of agriculture will fail in the competition. The questions set in agriculture will be based only on Professor Tanner's three text-books on the subject, namely:—"The Alphabet of the Principles of Agriculture"; "Further Steps in the Principles of Agriculture"; and "Elementary School Readings on the Principles of Agriculture." In all other subjects the standard will be the course prescribed for pupils of the fifth class in the Queensland State Schools.

Further particulars on application to the Under Secretary.

J. V. CHATAWAY,

Secretary for Agriculture.

PUBLIC ANNOUNCEMENT.

The Curator of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

THE CURATOR, BOTANIC GARDENS, BRISBANE,

and freight will be settled on delivery in Brisbane.

PLANT FOR DRY COUNTRY.

The Curator of the Botanic Gardens announces that he has for distribution seeds of a species of melon which is found in the arid region of South Africa known as the Kalihara Desert, and which renders existence and travel possible in that waterless country. He will be glad to send seeds to any person who will deposit them in sandy and waterless districts in Queensland.

The Hon. F. R. Moor, of the Natal House of Assembly and a member of the Natal Government, lately visiting Brisbane, states that this melon is the greatest boon which can be bestowed on an arid region.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp suckers for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

NOTICES.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of SIXPENCE to cover cost.

All communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, Henry A. Tardent; Hermitage State Farm, Warwick, manager, H. C. Quodling; Gindie State Farm, manager, R. Jarrott; Redland Bay Experiment Orchard, manager, J. Henderson; Kamerunga State Nursery, Cairns, overseer, G. B. Brooks.

THE
QUEENSLAND FLORA.

BY
F. MANSON BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

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ELECTORS OF QUEENSLAND.

In consequence of many pressing requests to become a candidate for election as one of your six representatives in the Federal Senate, I have accepted a nomination, and now place myself in your hands accordingly.

It is impossible in the time now available to address you personally at even the chief centres of population, but I trust that my political life in the past will be regarded by you as an assurance of earnest attention to the interests of Queensland, as well as of the whole Commonwealth in the wider field of public affairs on which we are now entering.

If elected, I will promote and support—

1. The effective organisation of the Legislative, Judicial, and Executive Departments of the Commonwealth upon sound lines of justice and economy ;
2. The early selection of the permanent seat of government ;
3. The establishment of a Defence System, not on a basis of ultra-militarism, but on that of a citizen soldiery, making instruction in the use of arms part of every young man's education. Australian arms and ammunition factories. Encouragement of rifle shooting ;
4. The adoption of the first uniform Tariff to produce sufficient revenue for Commonwealth and State requirements without destruction of existing industries ;
5. The recognition of the individuality of the several States, and of their varying circumstances and conditions. No unnecessary interference with State self-development ;
6. Exclusion of people of Asiatic or African races ;
7. The subordination of party questions during the earlier sessions of Parliament to the paramount necessity of first providing the essentials for the establishment and security of the Commonwealth ; and,
8. All legislation of a liberal and progressive spirit.

A. J. THYNNE.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	28 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Aug.
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	12 and 13 June
Birthingbamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer	
Bowen	Pastoral, Agricultural, and Mining Association	J. E. Smith	9 Aug.
Bowen	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane	Horticultural Society of Queensland ..	J. F. Bailey	30 April and 1 May
Brisbane	Queensland Acclimatisation Society	E. Grimley	
Brisbane	National Agricultural and Industrial Association of Queensland	J. W. Swain	21 to 24 May
Brisbane	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture ...	R. G. Curtis ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association ...	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy ...	
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet ..	
Cairns ...	Aloombah Farmers' Association ...	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association ...	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	Alan B. Bright ...	15, 16, 17 May
Childers ...	Isis Agricultural Association ...	H. Epps ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	P. McCauley...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association ...	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association ...	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	July
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers' Association ...	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association ...	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association ...	E. P. Itzstein ...	27 and 28 Dec.
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	13 and 14 Sept.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	W. Reid ...	
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...	25 and 26 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League ...	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River Herberton ...	Ripple Creek Farmers' Association ... Mining, Pastoral, and Agricultural Association	J. W. Grimes ... John M. Hollway ...	14 and 15 May
Hodgson ... Hughenden...	Hodgson Farmers' Association ... Hughenden Pastoral and Agricultural Association	C.W. Nimmo ... H. P. Blackall ...	7 and 8 May
Ingham ... Ingham ...	Herbert River Farmers' Association ... Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ... Laidley ...	Mungore Farmers' Association ... Lockyer Agricultural and Industrial Society (Annual Show, Laidley)	I. M. Robinson ... John Fielding ...	24 and 25 July
Loganholme... Longreach ...	Logan Farming and Industrial Association ... Longreach Pastoral and Agricultural Society	F. W. Peek ... J. P. Peterson ...	17 and 18 April
Lucinda Point Mackay ... Mackay ...	Victoria Farmers' Association ... Agricultural, Pastoral, and Mining Association Pioneer River Farmers' Association ...	W. S. C. Warren ... F. Black ... E. Swayne ...	4, 5, and 6 July
Mackay ... Mapleton, <i>via</i> Nambour	The Mackay and District Horticultural Society Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	Fred. Bourne ... W. J. Smith ...	
Maryborough Maryborough Maryborough Maryborough	Dairymen's Association ... Maryborough Horticultural Society ... The Island Farmers' Progress Association ... Wide Bay and Burnett Pastoral and Agricultural Society	G. E. Henty ... H. A. Jones ... C. A. Schmidt ... G. Willey ...	10, 11, and 12 July
Miallo ... Miara, Yandaran	Miallo Progress Association ... Avondale Farmers and Planters' Association	E. F. Welchman ... F. E. Eggar ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River Mount Cotton	Mosman River Farmers' Association ... Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	Geo. W. Muntz ... W. E. Burns ...	
Mount Mee... Mount Morgan	Mount Mee Farmers' Association ... Mount Morgan Agricultural, Pastoral, and Poultry Society	R. Thomas ... Thos. W. Walker ...	
Nambour ... Nambour ...	The Rosemount Association ... The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	George Etheridge ... J. R. Isgar ...	
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	1 Aug.
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ... North Pine ...	North Isis Canegrowers' Association ... Moreton Agricultural, Horticultural, and Industrial Association	W. J. Young ... J. Duffield ..	
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	Frank Shurvell ...	
Pialba ... Pinbarren ...	Pialba Farmers' Association ... Pinbarren Agricultural and Progress Association	J. B. Stephens ... H. Armitage, senr. ...	
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association		
Port Douglas Razorback ... Rockhampton Rockhampton	Pastoral, Agricultural, and Mining Association The Razorback Fruitgrowers' Association ... Alton Downs Farmers' Association ... Central Queensland Farmers and Selectors' Association	W. H. Dorrat ... Robert Tinning ... L. J. Landsberg ... T. Whitely, Coowonga	2 Aug.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	29 and 30 May
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ..	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	7 and 8 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	Chas. Parke	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	23 and 24 Jan.
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burt	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	5 and 6 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	30 and 31 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	29 June
Woodford ...	Woodford Progressive Industrial Association	E. Heaton	
Woombye ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	16 May
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	W. H. Whereat ...	

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the
Under Secretary for Agriculture, Brisbane,
or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	0
Or estimation of lime, potash, phosphoric acid, nitrogen	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes... ..	3	3	0

SCALE OF FEES—*continued*.

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c. Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	0
Sand	0	5	0
Nitrogen	0	7	6
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample	0	15	0
Milk, butter, cheese—Complete commercial analysis	1	1	0
Tanning materials—Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	3	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, Etc.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,

Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honey-suckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.
No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.
3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 28th January, 1901.

BURSARIES, QUEENSLAND AGRICULTURAL COLLEGE.

An Examination will be held on the 27th June next, in Brisbane and elsewhere, as may be decided upon, according to the localities where the candidates reside, for four Bursaries at the Queensland Agricultural College. These entitle the holders to free board and instruction as resident students, and are tenable during good behaviour and the pleasure of Parliament for a period of three years. Candidates must not be less than fourteen or more than sixteen years of age on the 30th June, 1901.

Application for examination must reach the Under Secretary for Agriculture, Brisbane, not later than the 17th May next, and must be accompanied by (1) a certificate of birth; (2) proof that the applicant has resided for two years in Queensland, or that his parents have resided there for three years preceding the Examination—this certificate to be attested by a magistrate; (3) a medical certificate that he is of sound constitution and in good health.

The Examination will cover the following subjects:—Writing, arithmetic, English composition, geography, and the elements of agriculture. Candidates not obtaining at least fifty per centum of marks in the elements of agriculture will fail in the competition. The questions set in agriculture will be based only on Professor Tanner's three text-books on the subject, namely:—"The Alphabet of the Principles of Agriculture"; "Further Steps in the Principles of Agriculture"; and "Elementary School Readings on the Principles of Agriculture." In all other subjects the standard will be the course prescribed for pupils of the fifth class in the Queensland State Schools.

Further particulars on application to the Under Secretary.

J. V. CHATAWAY,
Secretary for Agriculture.

PUBLIC ANNOUNCEMENT.

The Curator of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

THE CURATOR, BOTANIC GARDENS, BRISBANE,

and freight will be settled on delivery in Brisbane.

PLANT FOR DRY COUNTRY.

The Curator of the Botanic Gardens announces that he has for distribution seeds of a species of melon which is found in the arid region of South Africa known as the Kalihara Desert, and which renders existence and travel possible in that waterless country. He will be glad to send seeds to any person who will deposit them in sandy and waterless districts in Queensland.

The Hon. F. R. Moor, of the Natal House of Assembly and a member of the Natal Government, lately visiting Brisbane, states that this melon is the greatest boon which can be bestowed on an arid region.

SISAL HEMP PLANTS.

The Department of Agriculture having a quantity of sisal hemp suckers for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture.

PLANTS FOR DISTRIBUTION.

The Department of Agriculture has about 400 Cacao plants for distribution. Also, a quantity of seed and plants of Ceara Rubber (*Manihot Glaziovii*), suckers of Manilla Hemp and of Sisal Hemp.

Applications may be made to the Manager, Kamerunga State Nursery, Cairns.

The Cacao tree will only thrive on the Northern coast lands.

As Cacao plants are difficult to raise, a small charge of SIXPENCE each will be made for these plants.

NOTICES.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of SIXPENCE to cover cost.

All communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, Henry A. Tardent; Hermitage State Farm, Warwick, manager, H. C. Quodling; Gindie State Farm, manager, R. Jarrott; Inspector under the Diseases in Plants Act, Cairns, J. Henderson; Kamerunga State Nursery, Cairns, overseer, G. B. Brooks.

SEED WHEAT AND BARLEY.

Farmers desirous of obtaining pure seed wheat can obtain the following varieties at the

STATE FARM, HERMITAGE, WARWICK,

on application to the manager, Hermitage :—

WHEATS.

MARSHALL'S No. 3

MARSHALL'S No. 8

BUDD'S EARLY

ALLORA SPRING

BELATOURKA

BARLEY.

OLD ENGLISH CHEVALIER

SEA OF AZOF

CHILIAN

NEPAUL

HALLOT'S IMPROVED

PRICE of wheat and barley 5s. per bushel f.o.b. the railway.

A small quantity is also available at the State Farm, Westbrook.

THE
QUEENSLAND FLORA.

BY

F. MANSON BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 and 400 PAGES EACH, ROYAL OCTAVO.

PRICE, 5s. PER PART.

THE WORK IS NOW GOING THROUGH THE PRESS, AND PARTS

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QUEEN STREET.

Queensland Agricultural College.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshires, Tamworths,
Small, Middle, and Large Yorkshires.

PRICE:

Boars, £2 2s.; Sows, £1 1s., f.o.b. at Gatton Railway Station.

JOHN MAHON,
Principal.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	6 Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	28 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Aug.
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	12 and 13 June
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer ...	
Bowen ...	Pastoral, Agricultural, and Mining Association	H. C. P. Crees ...	1 July
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland ..	J. F. Bailey ...	30 April and 1 May
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	J. W. Swain	21 to 24 May
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ..	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ..	5 and 6 Sept.
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	25 and 26 May
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	Alan B. Bright ...	
Childers ...	Isis Agricultural Association	H. Epps ...	15, 16, 17 May
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	P. McCauley...	
Cooktown ..	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe ...	
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	31 July & 1 Aug.
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	27 and 28 Dec.
Degilbo ..	Degilbo District Farmers' Association	E. P. Itzstein ...	
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ..	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	28 and 29 Aug.
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	Hy. Jackson ...	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	25 and 26 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association... ..	Edwin S. Waller ...	

* Chrysanthemum Show.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	14 and 15 May
Hodgson ...	Hodgson Farmers' Association	C. W. Nimmo ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. P. Blackall ...	7 and 8 May
Ingham ...	Herbert River Farmers' Association		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	11 and 12 July
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers and Farmers' Association	C. Marks ...	
Ladeside ...	Mungore Farmers' Association	I. M. Robinson ...	
Laidley ...	Lockyer Agricultural and Industrial Society (Annual Show, Laidley)	John Fielding ...	14 and 15 May
Loganholme ...	Logan Farming and Industrial Association ...	F. W. Peek ...	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	17 and 18 April
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...	
Mackay ...	Pioneer River Farmers' Association	E. Swayne ...	4, 5, and 6 July
Mackay ...	The Mackay and District Horticultural Society	Fred. Bourne ...	
Mapleton, <i>via</i> Nambour	Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	W. J. Smith ...	
Maryborough	Dairymen's Association	G. E. Henty ...	
Maryborough	Maryborough Horticultural Society	H. A. Jones ...	
Maryborough	The Island Farmers' Progress Association ...	C. A. Schmidt ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	10, 11, and 12 July
Miallo ...	Miallo Progress Association	E. F. Welchman ...	
Miara, Yandaran	Avondale Farmers and Planters' Association	F. E. Eggar ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	Geo. W. Muntz ...	
Mount Cotton	Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	W. E. Burns ...	
Mount Mee ...	Mount Mee Farmers' Association	R. Thomas ...	
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	Thos. W. Walker ...	
Nambour ...	The Rosemount Association	George Etheridge ...	
Nambour ...	The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	J. R. Isgar ...	
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	1 Aug.
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	Frank Shurvell ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association		
Port Douglas	Pastoral, Agricultural, and Mining Association	W. H. Dorrat ...	2 Aug.
Razorback ...	The Razorback Fruitgrowers' Association ...	Robert Tinning ...	
Rockhampton	Alton Downs Farmers' Association	L. J. Landsberg ...	
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	4 June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams...	4 Oct.
Southport ...	Southport Horticultural Society	E. Fass ...	19 April
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	7 and 8 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan ...	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner ...	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins ...	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	W. G. Searle ...	23 and 24 Jan.
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burt ...	31 July ; 1 and 2 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ..	5 and 6 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman ...	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel ..	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke ...	30 and 31 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort ...	29 June
Woodford ...	Woodford Progressive Industrial Association	E. Heaton ...	
Woombye ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	16 May
Woombye ...	Woombye Fruitgrowers' Association ...	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth ...	
Zillmere ...	Zillmere Horticultural Society	W. H. Whereat ...	

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.
2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.
3. The samples may be forwarded by parcel post or by rail, carriage paid, to the

Under Secretary for Agriculture, Brisbane,

or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	0
Or estimation of lime, potash, phosphoric acid, nitrogen ...	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes...	3	3	0

SCALE OF FEES—*continued*.

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c. ...	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c. Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	0
Sand	0	5	0
Nitrogen	0	7	6
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample ...	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample ...	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample ...	0	15	0
Milk, butter, cheese—Complete commercial analysis... ..	1	1	0
Tanning materials— Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	3	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, Etc.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

Chief Secretary's Office,
Brisbane, 20th July, 1900.

THE following Proclamation, issued by His Excellency the Governor of Tasmania in Council, is published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 212.

Agricultural Department,
Hobart, 23rd June, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS it is expedient to permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), bearing even

date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of all citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, and all other plants (excepting fruit trees, cuttings, scions, buds, and grafts of fruit trees, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me, in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of the trees and plants so as aforesaid permitted by this my Proclamation to be imported, introduced or brought into Tasmania.

Given under my hand at Hobart, in Tasmania aforesaid, this twenty-second day of June, one thousand nine hundred.

GORMANSTON, Governor.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 25th July, 1900.

THE following Regulations, made by His Excellency the Governor of Tasmania in Council, under "The Vegetation Diseases Act, 1898," are published for general information.

ROBERT PHILP.

GOVERNMENT NOTICE.

No. 213.

Agricultural Department,
Hobart, 22nd June, 1900.

THE Governor in Council has been pleased to make the following Regulations, under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21).

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. Any nursery in which plants are grown for export to Tasmania shall hold a Certificate, signed by the Government Entomologist of the exporting country, that such nursery is free from all pests injurious to fruit trees; and such Certificate shall be forwarded to the Secretary for Agriculture in Tasmania.

2. Such plants as aforesaid shall be inspected by an Inspector of the Department of Agriculture of the said exporting country, duly appointed for that purpose, and, if found to be free from all pests injurious to fruit trees, a Certificate shall be issued to that effect by the said Inspector and forwarded to the Secretary for Agriculture in Tasmania.

3. All citrous trees, cone-bearing trees, ferns, cacti, geraniums, bulbs, or any plant (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees), shall, before shipment to Tasmania, be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for at least one hour, under the supervision of an Inspector duly appointed for that purpose, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture in Tasmania, that such fumigation has been properly carried out.

4. The plants above mentioned shall be unpacked for examination by an Inspector at the port of entry, in a fumigating chamber, and the packing destroyed. If, in the opinion of the Government Entomologist of Tasmania, the plants above mentioned can safely be introduced into Tasmania, such plants shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber, for not less than one hour before delivery, under the supervision of an Inspector duly appointed for that purpose in Tasmania, and a Certificate shall be issued by such Inspector, and forwarded to the Secretary for Agriculture for Tasmania, that such fumigation has been properly carried out.

5. The plants above mentioned shall be landed at the ports of Hobart and Launceston, and at no other port in Tasmania.

6. If any such plants are found to contain any pest the same shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee, provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting.

Chief Secretary's Office,

Brisbane, 4th September, 1900.

THE following Proclamations and Regulations, issued by His Excellency the Governor of Tasmania in Council, are published for general information.

JAMES R. DICKSON.

GOVERNMENT NOTICE.

No. 256.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of Section Three of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), absolutely prohibit the importation, introduction, and bringing into the Colony of Tasmania of any fruit trees, cuttings, scions, buds, and grafts of fruit trees: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the power and authority in me vested by Section Three of the said Act, and of every other power me in this behalf enabling, do hereby revoke my said recited Proclamation: And I hereby absolutely prohibit the importation, introduction, and bringing into the said Colony of Tasmania of all fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 257.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Vegetation Diseases Act, 1898."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture

"THE VEGETATION DISEASES ACT, 1898."

A PROCLAMATION.

WHEREAS I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, did, by a Proclamation dated the twenty-second day of June, one thousand nine hundred, made in pursuance of the provisions of "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), permit the importation, introduction, or bringing into Tasmania of the trees and plants therein named, subject to the performance of such conditions as were prescribed by certain Regulations therein referred to: And whereas it is expedient that such Proclamation as aforesaid should be revoked, and that other provision should be made in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief as aforesaid, in Council, in pursuance of the provisions of the said Act, do, by this my Proclamation, permit the importation, introduction, or bringing into Tasmania of any plant or plants (other than fruit trees, cuttings, scions, buds, and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry,

currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is absolutely prohibited), subject to the performance of such conditions as are prescribed, by Regulations made under the said Act bearing even date herewith, or by any Regulations under the said Act which may from time to time be made by me in Council: And I do hereby declare, that unless such conditions prescribed as aforesaid by Regulations made or to be made under the said Act, or any of them, are performed, I do hereby prohibit the importation, introduction, or bringing into Tasmania of any plant or plants so as aforesaid permitted by this my Proclamation to be imported, introduced, or brought into Tasmania.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 258.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to revoke the Regulations made under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), dated the twenty-second day of June, one thousand nine hundred, and to make the following Regulations under the said Act in lieu thereof.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

REGULATIONS.

1. The Regulations made by the Governor in Council under "The Vegetation Diseases Act, 1898" (62 Vict. No. 21), and published by Government Notice (No. 213), dated the twenty-second day of June, one thousand nine hundred, are hereby revoked, and replaced by the following Regulations:—

2. Any plant or plants (other than fruit trees, cuttings, scions, buds and grafts of fruit trees, and the barberry, linden, enonymus, grapevine, maple, acacias, rose, strawberry, raspberry, hawthorn, ash, gooseberry, currants, honeysuckle, lilac, privet, bignonia, elm, oak, birch, alder, chestnut, willow, and poplar, or cuttings, scions, buds, and grafts of any of the same, the importation of which is by Proclamation, dated the third day of August, one thousand nine hundred, absolutely prohibited) shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, or from Europe, be unpacked for examination by an inspector duly appointed for that purpose, at the port of entry, in a properly constructed fumigating chamber, and the packing destroyed, and such plant or plants shall be fumigated with Hydrocyanic Acid Gas for not less than one hour before delivery, under the supervision of such inspector.

3. Such plants shall, if imported, introduced, or brought into Tasmania from any of the Australian Colonies or New Zealand, be accompanied with a copy of a certificate signed by the Government Entomologist of the exporting country that the nursery in which such plants are grown for export is free from San José Scale; but this Regulation No. 3 shall not be deemed to apply to bulbs.

4. Such plants, before shipment to Tasmania from any of the Australian Colonies or New Zealand, shall be fumigated with Hydrocyanic Acid Gas in a properly constructed fumigating chamber for at least one hour, under the supervision of an inspector duly appointed for that purpose, and a certificate shall be issued by such inspector and forwarded to the Secretary for Agriculture in Tasmania that such fumigation has been properly carried out; but this Regulation No. 4 shall not be deemed to apply to bulbs, or to the importation, introduction, or bringing into Tasmania of same.

5. Any such plants, imported, introduced, or brought into Tasmania from any place whatever, shall be landed at the Ports of Hobart or Launceston, and at no other port in Tasmania.

6. If any such plants, imported, introduced, or brought into Tasmania from any place whatever, are found to contain any pest injurious to fruit trees, such plants shall be destroyed forthwith.

7. All costs and charges of inspection, fumigation, and destruction shall be borne by the consignee: provided that if such consignee be an agent only, all costs and charges as aforesaid shall be borne by the person for whom he is acting, and all costs and charges of inspection and fumigation as aforesaid shall be paid before the delivery of any such plants.

GOVERNMENT NOTICE.

No. 259.

Agricultural Department,

Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation under "The Diseased Animals Importation Prevention Act" (47 Vict. No. 2)

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE DISEASED ANIMALS IMPORTATION PREVENTION ACT."

A PROCLAMATION.

WHEREAS His Excellency the Honourable Sir JOHN STOKELL DODDS, Knight Companion of the Most Distinguished Order of Saint Michael and Saint George, Chief Justice of the Colony of Tasmania, Administrator of the Government thereof, in Council, did, by a Proclamation under his hand, dated the 26th day of July, one thousand eight hundred and ninety-nine, absolutely prohibit, for a period of Twelve months, the importation into Tasmania of any horses, cattle, and hides from the Colony of Queensland: Now, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, in Council, in pursuance of the power and authority in me vested by Section Three of the Diseased Animals Importation Prevention Act (47 Vict. No. 2), and of every other power me, in this behalf, enabling, do, by this my Proclamation, absolutely prohibit, for Twelve months as from the expiration of the said period, the importation into Tasmania of any horses, cattle, and hides from the said Colony of Queensland.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

GOVERNMENT NOTICE.

No. 260.

Agricultural Department,
Hobart, 3rd August, 1900.

THE Governor in Council has been pleased to issue the following Proclamation, under "The Contagious Diseases (Cattle) Act, 1861."

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

"THE CONTAGIOUS DISEASES (CATTLE) ACT, 1861."

A PROCLAMATION.

WHEREAS His Excellency Sir ROBERT GEORGE CROOKSHANK HAMILTON, Knight Commander of the Most Honourable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Tasmania and its Dependencies, did, by Proclamation given under his hand on the eighteenth day of August, one thousand eight hundred and eighty-eight, prohibit the importation into any part of Tasmania, except Hobart and Launceston, of all cattle imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to certain restrictions in such Proclamation set forth: And whereas it is expedient to annul the said Proclamation and to make other provision in lieu thereof: Now, therefore, I, the Right Honourable JENICO WILLIAM JOSEPH, Viscount Gormanston, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief in and over the colony of Tasmania and its Dependencies, in Council, by virtue of the powers conferred on me by "The Contagious Diseases (Cattle) Act, 1861," do hereby annul the hereinbefore-recited Proclamation made as aforesaid under the provisions of the said Act; and I do hereby permit the importation and landing to take place at Hobart and Launceston of all cattle for the purposes of slaughter only imported from the colonies of Victoria, New South Wales, Queensland, South Australia, Western Australia, and New Zealand, subject to the following restrictions:—

1. All such cattle imported into Hobart shall be landed at the cattle jetty, in the River Derwent, near the public slaughter-house for the city of Hobart, and shall be driven from such jetty along the fenced road leading from the said jetty between the Queen's Domain and the said river to the said slaughter-house.
2. All such cattle imported into Launceston shall be landed at the cattle jetty lately erected near the public slaughter-house situate at Inveresk, on the banks of the River Tamar, at a spot known as Home Reach, and shall be driven direct along the race connecting the said jetty with the slaughter-house yards.

No such cattle shall be landed upon that part of the said jetty which connects with the race leading away from the said public slaughter-house in the direction of the barrier fence erected at a chain radius from the said slaughter-house and the said jetty.

3. The captain or person in command of every ship or other vessel having any such cattle on board to be landed in this Colony shall forthwith, after his arrival in the Colony, notify to the Government Inspector of Stock at Hobart or Launceston, as the case may be, that such ship or other vessel has such cattle on board to be landed in this Colony.
4. All such cattle, upon being landed from any such ship or vessel, shall be inspected by the Government Inspector of Stock at the slaughter-house for Hobart, or at Inveresk, as the case may be; and all such cattle which on such inspection appear to be infected with any contagious or infectious disease shall be immediately killed and disposed of as the said Inspector of Stock may direct.

Given under my hand, at Hobart, in Tasmania aforesaid, this third day of August, one thousand nine hundred.

GORMANSTON, Govr.

By His Excellency's Command,

GEO. COLLINS, Minister for Agriculture.

Chief Secretary's Office,
Brisbane, 14th September, 1900.

THE following Proclamations, issued by His Excellency the Governor of New South Wales in Council, are published for general information.

JAMES R. DICKSON.

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 9 of the "Vegetation Diseases Act, 1897," from time to time by Proclamation in the *Gazette*, to declare any disease affecting plants to be a disease within the meaning of the said Act: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, declare Potato Scab (*Oospora scabies*) to be a disease within the meaning of the said Act.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

PROCLAMATION.

By His Excellency The Right Honourable WILLIAM, EARL BEAUCHAMP, Knight Commander of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

WHEREAS the Governor is empowered by section 1 of the "Vegetation Diseases Act, 1897," to prohibit, by Proclamation in the *Gazette*, the introduction into this colony of any plant which is likely to introduce any disease or insect into the said Colony: Now, therefore, I, WILLIAM, EARL BEAUCHAMP, the Governor aforesaid, with the advice of the Executive Council, do, by this my Proclamation, prohibit the introduction into this Colony from any place outside the Colony of any plant affected by the disease known as Potato Scab (*Oospora scabies*).

Any plant introduced in contravention to the above Proclamation may be forthwith destroyed, or otherwise dealt with as the Minister may direct.

Given under my Hand and Seal, at Government House, Sydney, this tenth day of August, in the year of our Lord one thousand nine hundred, and in the sixty-fourth year of Her Majesty's reign.

By His Excellency's Command,
JOHN L. FEGAN.

GOD SAVE THE QUEEN!

Department of Agriculture,
Brisbane, 28th January, 1901.

BURSARIES, QUEENSLAND AGRICULTURAL COLLEGE.

An Examination will be held on the 27th June next, in Brisbane and elsewhere, as may be decided upon, according to the localities where the candidates reside, for four Bursaries at the Queensland Agricultural College. These entitle the holders to free board and instruction as resident students, and are tenable during good behaviour and the pleasure of Parliament for a period of three years. Candidates must not be less than fourteen or more than sixteen years of age on the 30th June, 1901.

Application for examination must reach the Under Secretary for Agriculture, Brisbane, not later than the 17th May next, and must be accompanied by (1) a certificate of birth; (2) proof that the applicant has resided for two years in Queensland, or that his parents have resided there for three years preceding the Examination—this certificate to be attested by a magistrate; (3) a medical certificate that he is of sound constitution and in good health.

The Examination will cover the following subjects:—Writing, arithmetic, English composition, geography, and the elements of agriculture. Candidates not obtaining at least fifty per centum of marks in the elements of agriculture will fail in the competition. The questions set in agriculture will be based only on Professor Tanner's three text-books on the subject, namely:—"The Alphabet of the Principles of Agriculture"; "Further Steps in the Principles of Agriculture"; and "Elementary School Readings on the Principles of Agriculture." In all other subjects the standard will be the course prescribed for pupils of the fifth class in the Queensland State Schools.

ARITHMETIC.—1. Colenso's Shilling Arithmetic. 2. Longmans' Junior School Mensuration.

GEOGRAPHY.—J. B. Fewing's Handbook of Geography for Fifth Class.

ENGLISH COMPOSITION.—Longmans' Junior School Composition.

Further particulars on application to the Under Secretary.

J. V. CHATAWAY,
Secretary for Agriculture.

IMPORTATION OF PLANTS.

REGULATIONS RELATING TO THE INTRODUCTION OF TREES, PLANTS, AND FRUITS INTO SOUTH AUSTRALIA.

1. In these regulations the following words in inverted commas have the meanings set against them respectively, that is to say :—

“Minister” means the Minister of Education and Agriculture or the Minister for the time being controlling the Department of Education and Agriculture.

“Inspector” means an inspector appointed under “The Vine, Fruit, and Vegetable Protection Act, 1885.”

“Disease” and “Insect” have the meanings respectively assigned to them by section 3 of the said Act.

2 (a) The introduction into South Australia of grape vines and any portions thereof, from any country or place, is absolutely prohibited.

(b) Living trees, plants, or portions thereof (not being grape vines or portions thereof), and fruits (not being grapes) may be introduced into South Australia from any country or place under and subject to these regulations, but not otherwise.

(c) Living trees, plants, and portions thereof (not being fruit) shall (unless sent by post) only be introduced into South Australia at Port Adelaide.

(d) All living trees, plants, or portions thereof, intended for introduction into South Australia must, prior to being landed or introduced, be thoroughly cleansed of soil: Provided always that any inspector may admit plants growing in pots, if in his opinion there is no danger in importing them.

3. All living trees or plants, or portions thereof, or fruits introduced into South Australia from any country or place shall, on being landed or introduced, be forthwith delivered into the custody of some officer of Customs, and shall, at the expense of the importer or consignee thereof, be conveyed in original unopened packages to such place as the Minister shall direct.

4. An inspector shall examine such trees, plants, or portions thereof, or fruits, and may treat such trees, plants, or portions thereof, or fruits, in such manner as he may think desirable, or may order that such trees or plants, or portions thereof, or fruits, and the boxes or packages in which they were packed, or either of them, shall be destroyed by fire if, in his opinion, there is any danger in importing them.

5. The expense of conveying such trees, plants, portions thereof, or fruits to the place fixed for their examination, and of the examination and treatment or destruction thereof, shall be borne by the consignee or introducer thereof, and shall be paid before they are delivered to such consignee or introducer.

6. No person shall be entitled to any compensation by reason of the destruction of any tree, plant, portion thereof, or fruits, or of any box or package under these regulations.

REGULATIONS FOR PREVENTING THE SPREAD OF INSECTS AND DISEASES.

7. No person shall keep or sell, or expose or offer for sale, or in any manner cause the distribution of any living insect of the kind prohibited in any stage of its existence, or any tree, plant, or fruit infested with or affected by any insect or disease.

PENALTIES.

8. Any person guilty of any breach of the above regulations is liable to a penalty of not less than £5 nor more than £100, or to be imprisoned for any period not exceeding six months.

REPEAL.

9. The regulations relating to the introduction of trees, fruits, and plants into South Australia, made by proclamation dated the 21st day of November, 1900, and published in the *Government Gazette* on the 6th day of December, 1900, are hereby repealed.

PUBLIC ANNOUNCEMENT.

The Curator of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

THE CURATOR, BOTANIC GARDENS, BRISBANE,

and freight will be settled on delivery in Brisbane.

PLANT FOR DRY COUNTRY.

The Curator of the Botanic Gardens announces that he has for distribution seeds of a species of melon which is found in the arid region of South Africa known as the Kalihara Desert, and which renders existence and travel possible in that waterless country. He will be glad to send seeds to any person who will deposit them in sandy and waterless districts in Queensland.

The Hon. F. R. Moor, of the Natal House of Assembly and a member of the Natal Government, lately visiting Brisbane, states that this melon is the greatest boon which can be bestowed on an arid region.

SEEDS AND PLANTS FOR DISTRIBUTION.

The Department of Agriculture having a quantity of seed and plants of Ceara Rubber (*Manihot Glaziovii*) and suckers of Manilla Hemp and Sisal Hemp for gratuitous distribution, intending planters are requested to make early application for the same to the Under Secretary for Agriculture, or to the Manager, Kamerunga State Nursery, Cairns.

NOTICES.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at NINEPENCE each.

All communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, Henry A. Tardent; Hermitage State Farm, Warwick, manager, H. C. Quodling; Gindie State Farm, manager, R. Jarrott; Inspector under the Diseases in Plants Act, Cairns, J. Henderson; Kamerunga State Nursery, Cairns, overseer, G. B. Brooks

SEED WHEAT AND BARLEY.

Farmers desirous of obtaining pure seed wheat can obtain the following varieties at the

STATE FARM, HERMITAGE, WARWICK,

on application to the manager, Hermitage:—

WHEATS.

MARSHALL'S No. 3
MARSHALL'S No. 8
BUDD'S EARLY

ALLORA SPRING
BELATOURKA

BARLEY.

OLD ENGLISH CHEVALIER
SEA OF AZOF
CHILIAN

NEPAUL
HALLOT'S IMPROVED

PRICE of wheat and barley 5s. per bushel f.o.b. the railway.

A small quantity is also available at the State Farm, Westbrook.

All applications for Seed Wheat must reach the Manager by the First day of June, the quantity for distribution being limited.

THE
QUEENSLAND FLORA.

BY
F. MANSON BAILEY, F.L.S.,

COLONIAL BOTANIST OF QUEENSLAND.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 and 400 PAGES EACH, ROYAL OCTAVO.

PRICE, 5s. PER PART.

THE WORK IS NOW GOING THROUGH THE PRESS, AND PARTS
1 AND 2 ARE NOW FOR SALE BY
MESSRS. GORDON AND GOTCH,
QUEEN STREET.

Queensland Agricultural College.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshires, Tamworths,
Small, Middle, and Large Yorkshires.

PRICE:

Boars, £2 2s.; Sows, £1 1s., f.o.b. at Gatton Railway Station.

JOHN MAHON,
Principal.

Public Announcements.

The Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

The *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

ADVERTISEMENTS.

Advertisements which relate wholly to the sale of Agricultural Machinery, Seeds, Plants, Manures, Farm Stock, Feeding Stuff, &c., will be inserted in the *Journal* at the following rates:—

	£	s.	d.
Full page, per issue	4	0	0
Half page, per issue	2	10	0
Quarter page, per issue	1	10	0

On advertisements standing for six months a discount of 15 per cent. will be allowed, and 25 per cent. on those inserted for twelve months.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	6 Feb.
Ayr	Lower Burdekin Farmers' Association ...	Winsor H. Wilmington	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	28 June
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Aug
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	12 and 13 June
Biggenden ...	Biggenden Farmers' Association	W. Nott	
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	14 and 15 June
Bowen ...	Bowen Fruitgrowers and Farmers' Association	W. S. Palmer ...	
Bowen ...	Pastoral, Agricultural, and Mining Association	H. C. P. Crees ...	29 Aug.
Bowen ...	Proserpine Farmers and Settlers' Association	Joseph Cooper ...	
Booyal ...	Booyal Farmers' Progress Association ...	Thos. Skillington ...	
Brisbane ...	Horticultural Society of Queensland	J. F. Bailey ...	30 April and 1 May
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	National Agricultural and Industrial Association of Queensland	J. W. Swain ...	21 to 24 May
Brisbane ...	Queensland Fruit and Economic Plantgrowers' Association	J. F. Cooksley ...	
Brisbane ...	Queensland Stockbreeders and Graziers' Association	F. A. Blackman ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...	
Bundaberg ...	Council of Agriculture	R. G. Curtis ...	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	W. H. Dart ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Byrnestown...	Byrnestown Farmers' Progress Association ...	J. Dufficy ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ..	
Cairns ...	Aloombah Farmers' Association	Chas. R. Spencer ...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	5 and 6 Sept.
Cairns ...	Cairns District Coffee-growers' Association ...	W. A. Hannam ...	
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...	
Cairns ...	Hambledon Planters' Association	A. M. Stephens ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	E. F. C. Manning ...	25 and 26 May
Charters Towers	Charters Towers Pastoral, Agricultural, and Mining Association	Alan B. Bright ...	15, 16, 17 May
Childers ...	Isis Agricultural Association	H. Epps ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	P. McCauley... ..	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cooran ...	Cooran Progress and Agricultural Association	Thos. Smith ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe ...	
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association	J. Winward ...	
Dalby ...	Northern Downs Pastoral and Agricultural Association	W. M. Alexander ...	31 July & 1 Aug.
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers' Association	W. E. Burton ...	
Deception Bay	Deception Bay Farmers' Association	B. J. T. Liscombe ...	
Degilbo ...	Degilbo District Farmers' Association	E. P. Itzstein ...	27 and 28 Dec.
Forest Hill ...	Forest Hill Farmers' Progress Association ...	D. S. Foreman ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Warden ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	28 and 29 Aug.
Gympie ...	Chatsworth Farmers' Progress Association ...	William Bellman ...	
Gympie ...	Deep Creek Farmers' Progress Association ...	Hy. Jackson ...	
Gympie ...	Gympie Horticultural Society	Charles Brasch ...	25 and 26 April
Gympie ...	The Pie and Eel Creek Farmers' Association	Wm. H. Ryan ...	
Gympie ...	Gympie Central Farmers and Progress Association	J. Howard Maynard	
Haslemore, Victoria, Herbert Riv.	Herbert River Farmers' League	Alfred Henry ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	Jas. Tysoe ...	
Herbert River	Halifax Planters' Club	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association... ..	Edwin S. Waller ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River Herberton ...	Ripple Creek Farmers' Association Mining, Pastoral, and Agricultural Association	J. W. Grimes ... John M. Hollway ...	14 and 15 May
Hodgson ... Hughenden...	Hodgson Farmers' Association Hughenden Pastoral and Agricultural Association	C.W. Nimmo ... H. P. Blackall ...	7 and 8 May
Ingham ... Ingham ...	Herbert River Farmers' Association Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	27 Sept.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	14 and 15 Aug.
Kandanga (near Gympie) Kolan ...	Kandanga Farmers' Association Kolan Canegrowers and Farmers' Association	N. Rasmussen ... C. Marks ...	
Ladeside ... Laidley ...	Mungore Farmers' Association Lockyer Agricultural and Industrial Society (Annual Show, Laidley)	I. M. Robinson ... John Fielding ...	14 and 15 May
Loganholme... Longreach ...	Logan Farming and Industrial Association ... Longreach Pastoral and Agricultural Society	F. W. Peek ... J. P. Peterson ...	17 and 18 April
Lucinda Point Mackay ... Mackay ...	Victoria Farmers' Association Agricultural, Pastoral, and Mining Association Pioneer River Farmers' Association	W. S. C. Warren ... F. Black ... E. Swayne ...	4, 5, and 6 July
Mackay ... Mapleton, <i>via</i> Nambour	The Mackay and District Horticultural Society Mapleton and Dulong Fruitgrowers and Farmers' Progress Association	Fred. Bourne ... W. J. Smith ...	
Maryborough Maryborough Maryborough Maryborough	Dairymen's Association Maryborough Horticultural Society The Island Farmers' Progress Association ... Wide Bay and Burnett Pastoral and Agricultural Society	G. E. Henty ... H. A. Jones ... C. A. Schmidt ... G. Willey ...	10, 11, and 12 July
Miallo ... Miara, Yandaran Mitchell ...	Miallo Progress Association Avondale Farmers and Planters' Association Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	E. F. Welchman ... F. E. Eggar ... H. J. Corbett ...	
Mosman River Mount Cotton	Mosman River Farmers' Association Mount Cotton and Tingalpa Division Fruitgrowers and Farmers' Association	Geo. W. Muntz ... W. E. Burns...	
Mount Mee... Mount Morgan	Mount Mee Farmers' Association Mount Morgan Agricultural, Pastoral, and Poultry Society	R. Thomas ... J. S. Lyle ...	16 and 17 Aug.
Nambour ... Nambour ...	The Rosemount Association The Nambour, Blackall Range, and Moreton Agricultural, Mining, and Pastoral Society	George Etheridge ... J. R. Isgar ...	
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	1 Aug.
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	5 Oct.
North Isis ... North Pine ...	North Isis Canegrowers' Association Moreton Agricultural, Horticultural, and Industrial Association	W. J. Young ... J. Duffield ..	
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	Frank Shurvell ...	
Pialba ... Pinbarren ...	Pialba Farmers' Association Pinbarren Agricultural and Progress Association	J. B. Stephens ... H. Armitage, senr. ...	
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association		
Port Douglas Razorback ...	Pastoral, Agricultural, and Mining Association The Razorback Fruitgrowers' Association ...	W. H. Dorrat ... Robert Tinning ...	2 Aug.
Rockhampton Rockhampton	Alton Downs Farmers' Association Central Queensland Farmers and Selectors' Association	L. J. Landsberg ... T. Whitely, Coowonga	
Rockhampton	Central Queensland Stockowners Association	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	4 June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson ...	
Roma ...	Yingerbay Farmers' Association	Alex. C. McIntyre ...	
Rosewood ...	Farmers' Club	P. H. Adams... ..	26 Sept.
Southport ...	Southport Horticultural Society	E. Fass	19 April
Springure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	7 and 8 Feb.
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
Stanwell ...	The Stanwell Agricultural Society	A. Spanner	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler	
Toowoomba...	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba...	Drayton and Toowoomba Agricultural and Horticultural Society	W. G. Searle	23 and 24 Jan.
Toowoomba...	Royal Agricultural Society of Queensland ...	F. Burt	6, 7, and 8 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	5 and 6 June
Upper North Pine	Upper North Pine Farmers' Association ...	J. Skerman	
Wallumbilla	Wallumbilla Selectors' League	George Dalziel	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	30 and 31 Jan.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	F. W. Wort	29 June
Woodford ...	Woodford Progressive Industrial Association	E. Heaton	
Woombye ...	Maroochie Pastoral, Agricultural, Horticultural, and Industrial Association	Ernest E. Dalton ...	16 May
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	G. T. Worth	
Zillmere ...	Zillmere Horticultural Society	W. H. Whereat ...	

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTIONS FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses will be carried out in the order in which the samples are received at the Laboratory, with the exception of perishable substances like sugar-cane juice, milk, &c., which will be analysed immediately after arrival.

2. Should any person wish for an immediate analysis, the fee, charged in accordance with the scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, carriage paid, to the
Under Secretary for Agriculture, Brisbane,
or direct to the

Agricultural Chemist, Chemical Laboratory, Agricultural College, Gatton.

In all cases a letter, giving full instructions as to the information required, and enclosing the prescribed fee, must be sent at the same time.

4. Analyses will only be carried out if these instructions are adhered to, and if the samples are taken in accordance with further instructions issued below.

SCALE OF FEES.

	£	s.	d.
Soil—Partial chemical analysis, estimation of humus, nitrogen, lime, and total matter, insoluble in HCl	2	0	0
Or estimation of lime, potash, phosphoric acid, nitrogen	2	2	0
Soil and subsoil—Partial analyses of the two samples according to either the one or the other of above eight schemes... ..	3	3	0

SCALE OF FEES—*continued*.

	£	s.	d.
Soil—Complete chemical analysis, giving moisture, humus, nitrogen, and all the mineral constituents soluble in hydrochloric acid	3	3	0
Soil and subsoil—Complete chemical analysis	5	5	0
Soil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	4	4	0
Soil and subsoil—Complete chemical analysis, as above; mechanical analysis, separation into gravel, sand, clay; and physical properties, as capacity for water, capillary and absorptive power, &c.	7	7	0
Water—Partial analysis, giving total solids, loss on ignition, chlorine, ammonia, and albuminoid ammonia	2	2	0
Water—Complete analysis (without bacteriological examination)...	3	3	0
Manures—As bone ash, bonemeal, superphosphates, Thomas slag, kainite, ammonia salts, meatworks refuse, &c.			
Complete analysis, giving moisture, ash, sand, organic matter, phosphoric acid (soluble and insoluble), nitrogen, lime, potash	2	2	0
Determination only of—			
Moisture	0	5	0
Sand	0	5	0
Nitrogen	0	7	6
Potash	0	8	6
Total phosphoric acid	0	15	0
Phosphoric acid (citrate soluble)	0	15	0
Phosphoric acid (water soluble)	0	10	0
Food stuffs—Complete analysis, giving moisture, albuminoids, oil or fat, carbohydrates, ash, raw and digestible fibre	2	2	0
Estimation only of—			
Moisture	0	5	0
Albuminoids	0	10	0
Oil or fat	0	7	6
Ash	0	5	0
Total fibre	0	7	6
Digestible fibre	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	1	1	0
If more than one sample, every additional sample	0	10	6
Sugar-cane juice—Estimation of cane-sugar, fruit-sugar, total solids, water, quotient of purity, % Brix or Beaume	0	15	0
If more than one sample, every additional sample	0	7	6
Sugars, massecuites, molasses, jellies—Analysis of	1	1	0
If more than one sample, every additional sample	0	15	0
Milk, butter, cheese—Complete commercial analysis... ..	1	1	0
Tanning materials— Assay of tannin	1	0	0
Soaps—Commercial analysis	1	10	0
Limestone, cement, clay, marls, &c.	0	0	0

The fee for any other analytical work not mentioned may be learned on application.

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

In order to obtain a fair average sample of the soil from a block of land, as nearly as possible equal quantities of soil are collected from various parts of the field.

A rough sketch of the field, paddock, or block of land from which the samples were taken should accompany the samples. The spots where the samples were taken are marked on this plan and are numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall, and aspect of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Take careful note and description of soils in each hole, as numbered and marked on plan given. The samples of soil collected on the one bag are thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed in a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps.

A short description of the land must accompany the samples and the sketch plan. In the case of cultivated land, state how long the land has been under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, can benefit be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water must be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care must be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures from bags, the samples must be taken from different bags and at different places of the bag and not only from the top; or the contents are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS, ETC.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry foodstuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 2 lb. This quantity is then dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis, stating how much of the original green stuff the total amount of the dried material sent represents. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of 1 square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples must be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples just after flowering, and immediately before ploughing in.

Samples of Sugar-cane, Sorghum, &c., are sent in bundles of six to ten whole stalks, wrapped up in sacks. Give nature, variety, and age of the crop.

Samples of Sugar-cane Juice, as, for instance, obtained at the rollers of sugar-mill, must be sent in clean bottles holding about a pint of juice. The juice may be preserved by the addition of a drop or two of formaline, or by sterilising the juice by heating the bottle containing the juice, before corking up, in a bucket or pan of warm water, gradually raising the heat until the juice in the bottle reaches a temperature of about 140 degrees Fahr.

Samples of Milk or Cream, for analysis, are best preserved by addition of a few drops of formaline solution; other preservatives should not be used.

Should a sample be taken with the view of checking the composition of an article to be sold or bought—for instance, the value of a maure sold and guaranteed to contain a certain amount of fertilising substances—an average sample must first be taken by the buyer in presence of the vendor. This sample is to be divided into three portions, each portion being securely fastened, marked, and sealed by both parties, each retaining a portion for further reference, and forwarding the third sample to be analysed.

NOTICES.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at NINEPENCE each.

All communications on matters connected with the literary department of the *Queensland Agricultural Journal* must be addressed to the Editor. Questions or articles referring to stock should be addressed to the Chief Inspector of Stock; and all departmental inquiries are to be sent to the Under Secretary, Department of Agriculture.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Inspector of State Farms, Department of Agriculture, W. Soutter; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, G. B. Brooks; Hermitage State Farm, Warwick, manager, H. C. Quodling; Gindie State Farm, manager, R. Jarrott; Inspector under the Diseases in Plants Act, Cairns, J. Henderson; Kamerunga State Nursery, Cairns, overseer, ———

Department of Agriculture,
Brisbane, 28th January, 1901.

BURSARIES, QUEENSLAND AGRICULTURAL COLLEGE.

An Examination will be held on the 27th June next, in Brisbane and elsewhere, as may be decided upon, according to the localities where the candidates reside, for four Bursaries at the Queensland Agricultural College. These entitle the holders to free board and instruction as resident students, and are tenable during good behaviour and the pleasure of Parliament for a period of three years. Candidates must not be less than fourteen or more than sixteen years of age on the 30th June, 1901.

Application for examination must reach the Under Secretary for Agriculture, Brisbane, not later than the 17th May next, and must be accompanied by (1) a certificate of birth; (2) proof that the applicant has resided for two years in Queensland, or that his parents have resided there for three years preceding the Examination—this certificate to be attested by a magistrate; (3) a medical certificate that he is of sound constitution and in good health.

The Examination will cover the following subjects:—Writing, arithmetic, English composition, geography, and the elements of agriculture. Candidates not obtaining at least fifty per centum of marks in the elements of agriculture will fail in the competition. The questions set in agriculture will be based only on Professor Tanner's three text-books on the subject, namely:—"The Alphabet of the Principles of Agriculture"; "Further Steps in the Principles of Agriculture"; and "Elementary School Readings on the Principles of Agriculture." In all other subjects the standard will be the course prescribed for pupils of the fifth class in the Queensland State Schools.

ARITHMETIC.—1. Colenso's Shilling Arithmetic. 2. Longmans' Junior School Mensuration.

GEOGRAPHY.—J. B. Fewing's Handbook of Geography for Fifth Class.

ENGLISH COMPOSITION.—Longmans' Junior School Composition.

Further particulars on application to the Under Secretary.

J. V. CHATAWAY,
Secretary for Agriculture.

SEED WHEAT AND BARLEY.

Farmers desirous of obtaining pure seed wheat can obtain the following varieties at the

STATE FARM, HERMITAGE, WARWICK,
on application to the manager, Hermitage:—

WHEATS.

MARSHALL'S No. 3
MARSHALL'S No. 8
BUDD'S EARLY

ALLORA SPRING
BELATOURKA

BARLEY.

OLD ENGLISH CHEVALIER
SEA OF AZOF
CHILIAN

NEPAUL
HALLOT'S IMPROVED

PRICE of wheat and barley 5s. per bushel f.o.b. the railway.

A small quantity is also available at the State Farm, Westbrook.

All applications for Seed Wheat must reach the Manager by the First day of June, the quantity for distribution being limited.

PUBLIC ANNOUNCEMENT.

The Curator of the Botanic Gardens desires to state that, a new aviary having been erected in the Gardens, he will be glad to receive birds in exchange for plants.

Birds may be put on rail or boat, addressed to

THE CURATOR, BOTANIC GARDENS, BRISBANE,

and freight will be settled on delivery in Brisbane.

The

January
1901

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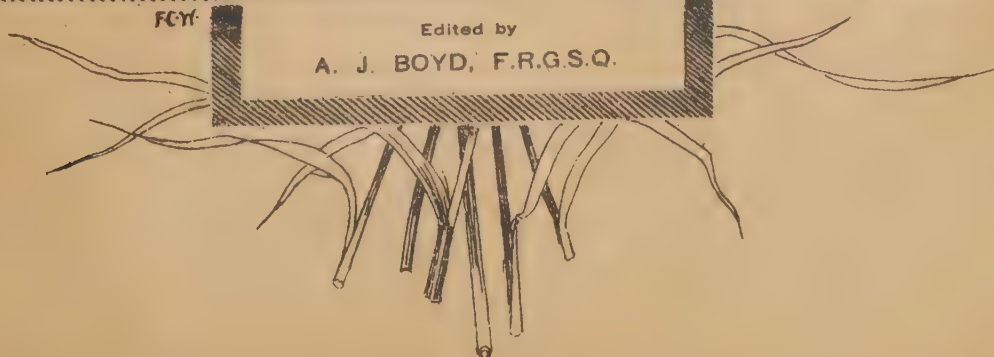
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FCM

Edited by
A. J. BOYD, F.R.G.S.Q.



A MARKET FOR GRAPES.

IN response to inquiries made by the Department of Agriculture as to whether Queensland Grapes will be admitted into New South Wales, a favourable reply has been received from the authorities in that State. The Queensland crop is now beginning to be gathered, and a good market should be found in Sydney, as the New South Wales crops come in much later than in Queensland. Vignerons with abundant crops of grapes might do well by exporting to the South.

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The

February
1901

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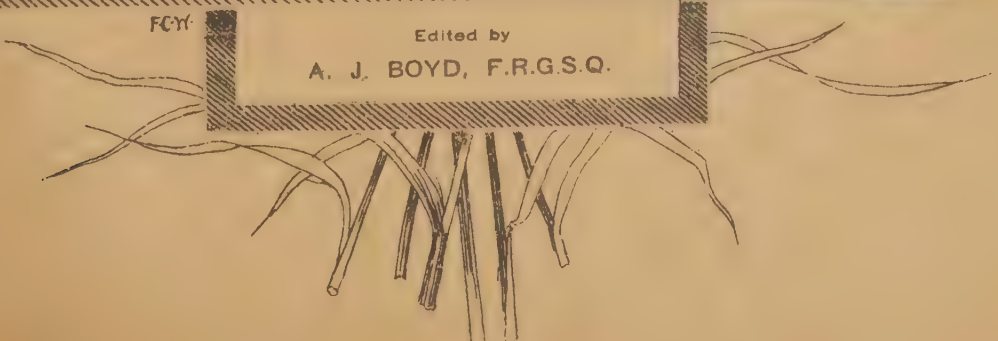
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